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FUJI PROGRAMMABLE CONTROLLER

MICREX-F General Interface Module

USER'S MANUAL Type : FFU120B

FEH087b

Introduction

Check the articles for any missing items or damage. If you notice any defects, please advise the FUJI branch office where you purchased it from. Read this User's manual thoroughly before handling for proper operation.

Your interface module package includes the following item.

Name	Quantity	Remark
User's manual (FEH087)	1	This User's manual

Please supply the cable and connector not included.

This manual outlines the following subject matter.

Chapter 1 Summary

This chapter describes module features that will help you look your very best in interface, notes and summary operations.

Chapter 2 System Configurations

This chapter describes sample configurations (1:1 and 1:N) and notes for the system.

Chapter 3 Specification

This chapter describes in detail the module specifications.

Chapter 4 Initialization

This chapter describes the initialization for the module.

Chapter 5 Data Transmission

This chapter describes the communication format of a personal computer for data reception and the program for data transmission from the MICREX-F.

Chapter 6 Installation

This chapter describes notes on module installation and its operation.

Chapter 7 Sample Program

This chapter introduces the sample program for testing the communication system of this module.

Appendix

The appendixes list data communication terms, RS-232C signal symbols and JIS symbols. Also, a helpful table is provided for use during initialization to construct the modules system.

[Remarks]

We provide user's manuals for system design, programming and maintenance. Any additional manuals you may need are at the Fuji branch office nearest you.

- F80H/F120H series < Software > LEH914
- F80H/F120H series < Hardware > LEH913

Reference manuals provided for this module are as follows.

- General interface module and capsule
  FFK120A-C10 ..... FEH088

Remarks

1. This manual may not be reproduced in whole or parts in any form without prior written approval from Fuji Electric., Co., Ltd.
2. The contents of this manual (including specifications) are subject to change for improvement without prior notice.
3. If you find any ambiguous or incorrect descriptions in this manual, please write them down (with the manual number).

REVISION RECORD

* Manual number is printed on the front cover in the lower right hand corner.

Date of printing	* Manual number	Description
August 1992	FEH087b	First edition

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1. Summary

2. System Configuration

3. Specifications

4. Initialization

5. Data Transmission

6. Installation

7. Sample Programs

Appendix

Chapter 1

Summary

1. Summary

This module interfaces the data exchange between the MICREX-F Series processor and external devices via the bus connection.

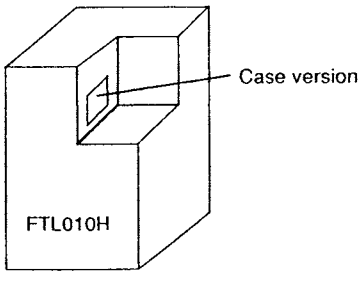
Interfacing to external devices is in accordance with RS-232C or RS-485, transmission procedure is for support of the Start-Stop Synchronization (non-procedure).

1-1 Features

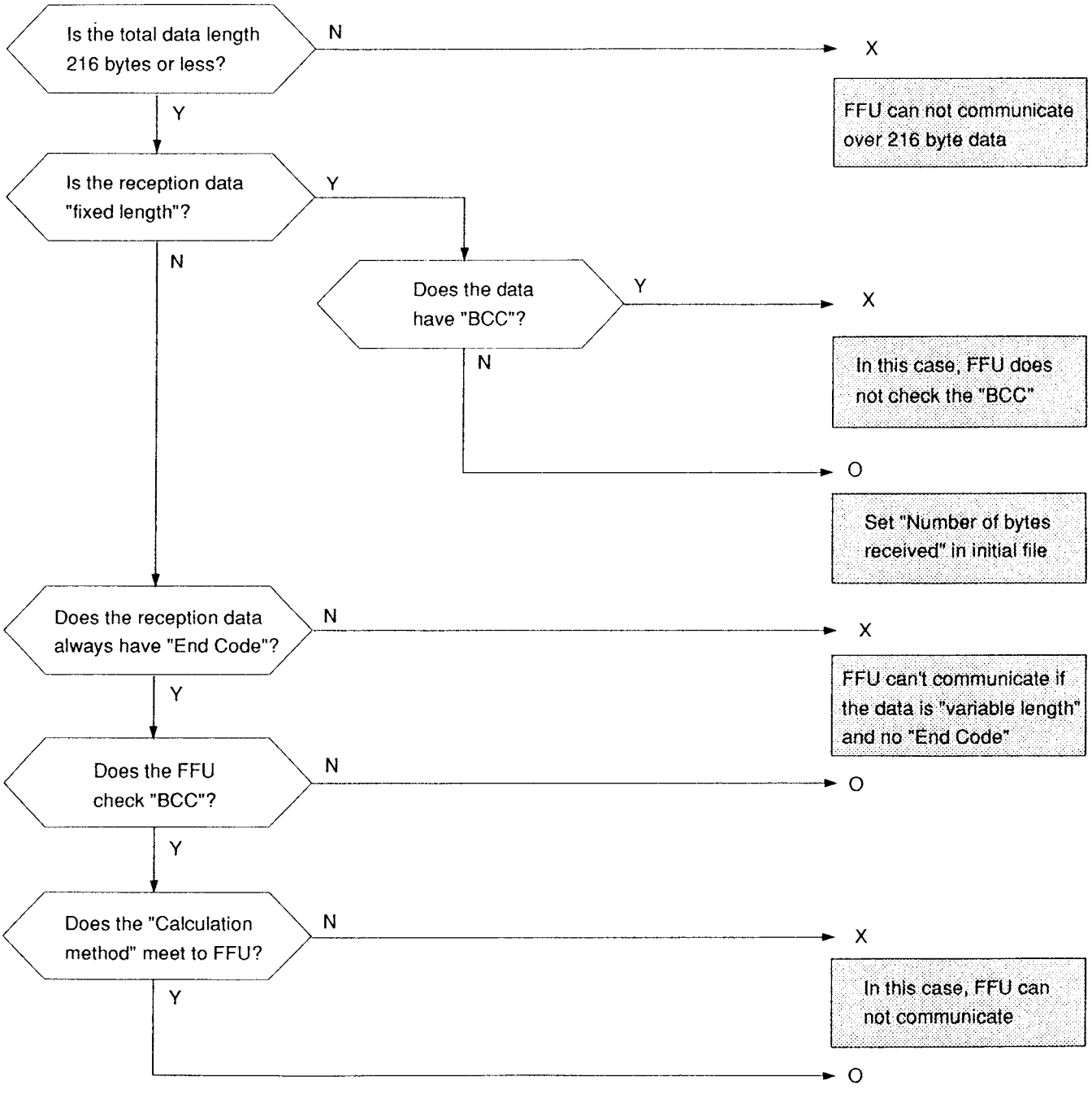
1. Since this module and MICREX-F processor are communicated by a bus connection, one step installation can be done as other I / O modules.
2. The network is capable of a 1km maximum according to 1:1 system or 1: N system. (Maximum of 31 units by the RS-485) (Maximum of 15m between each unit in RS-232C).
3. This module includes a converter and allows the interface system to convert RS-232C into RS-485. Thus, there is no need for a converter.
4. The module can be operated as either master or slave.
5. Setting of the non-procedure of Command Set Type Start-Stop Synchronization or non-procedure of Start-Stop Synchronization can be converted easily by switch.

1-2 Notes on Precautions

1. This module is used to mount on the base of processor MICREX-F F80H and F120H series. It is incapable of mounting on the processor F80, F81, F120 and F200 series.
   (Unsuitable mounting may result in malfunctions to the processor as fatal fault.)
2. Use the specified transmission cable, and the cable must be isolated from power lines and control cables etc. when wiring.
3. One must acquaint themselves with the basic skills of personal computers and data communication to operate this capsule to its fullest potential.
4. Setting up a system environment using this capsule requires specific tasks. To familiarize yourself with the setup tasks, please read this user's manual thoroughly.
5. If using on FTL010H, use FTL010H case version "04B" or later.



6. If communicating to an external device, please check that the data format specifications match those of FFU or not.



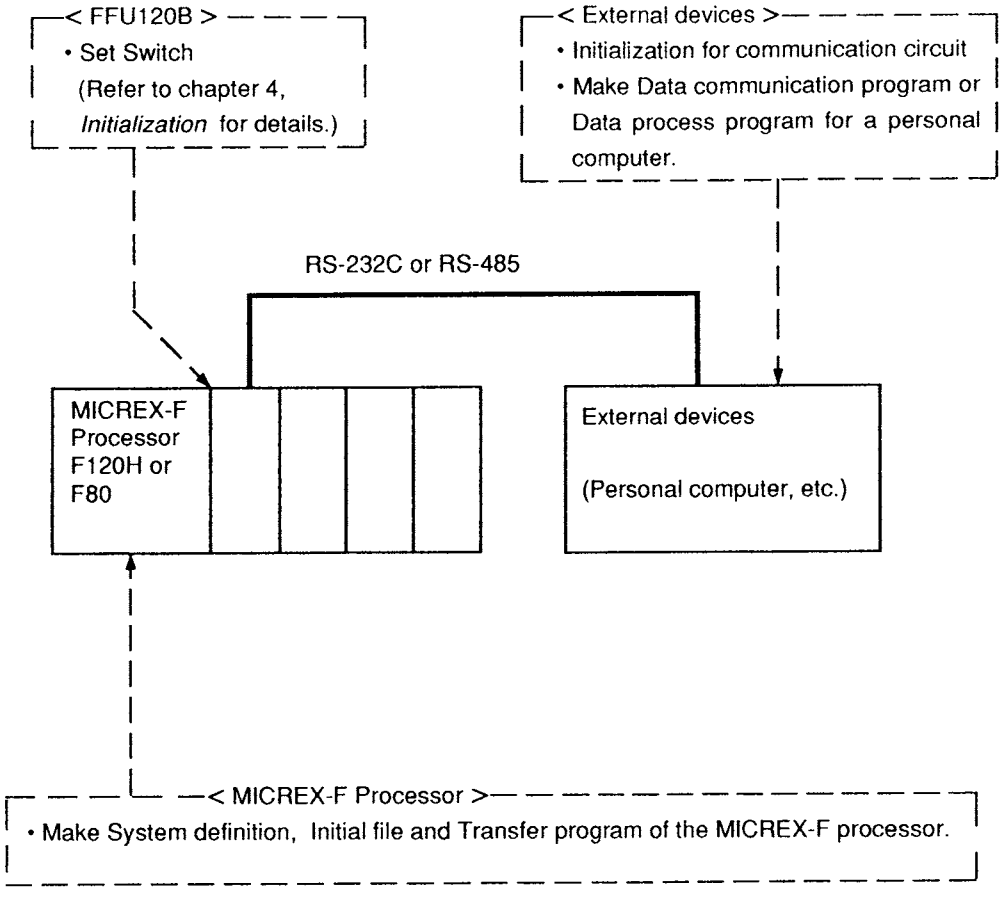
1-3 Operation Mode Summary

The table listed below contains the functions of Operation Modes 1 to 5 that can be changed by the Mode Switch Dial.

MODE switch No.	Procedure and transmission line		Connection system	Connected equipment	Maximum length of transmission data (Bytes)	Initial setup of RS-232C and RS-485	Remarks
1	Non-procedure of command set type Start-Stop Synchronization	RS-232C	1 : 1	Personal Computer	Read command 212 Write command 220 Data transmission 220	Set by built-in switch of a module or set by transferring initial file from processor	Suitable for FFK100A, FMC-312A-T
2		RS-485 (RS-232C)	(Master) (Slave) 1 : N	Master : Personal computer Slave : FFU			RS-232C and RS-485 can be converted
3		RS-485	1 : N				
4	Non-procedure of Start-Stop Synchronization	RS-232C	1 : 1	Device with RS-232C	216	Set by transferring initial file from processor	Suitable for FFK100A, FMC-311A-T
5		RS-485	1 : N	Device with RS-485			

1-4 Notions of Data Communication

This is an interface module that interfaces data communication between external devices such as a personal computer and the MICREX-F processor. The module utilizes the circuit of RS-232C or RS-485 for communication to external devices. Therefore, its communication speed, synchronized method and transmission code etc., must be adjusted according to the specifications of the external devices.



Chapter 2

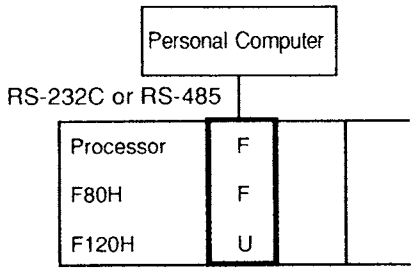
System Configurations

2-1 System Configurations

Illustrates sample configurations applied with this module.

① Sample configuration 1, 1 :1 transmission system

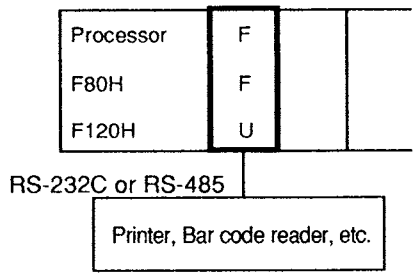
Set mode	No.1 or No.3



- The personal computer side must be equipped with either RS-232C or RS-485.
- If the transmission line uses RS-485, turn "ON" the terminating resistor switch of the RS-485 and also place a resistor (100Ω1W) on the personal computer side.

② Sample configuration 2, 1 :1 transmission system

Set mode	No.4 or No.5



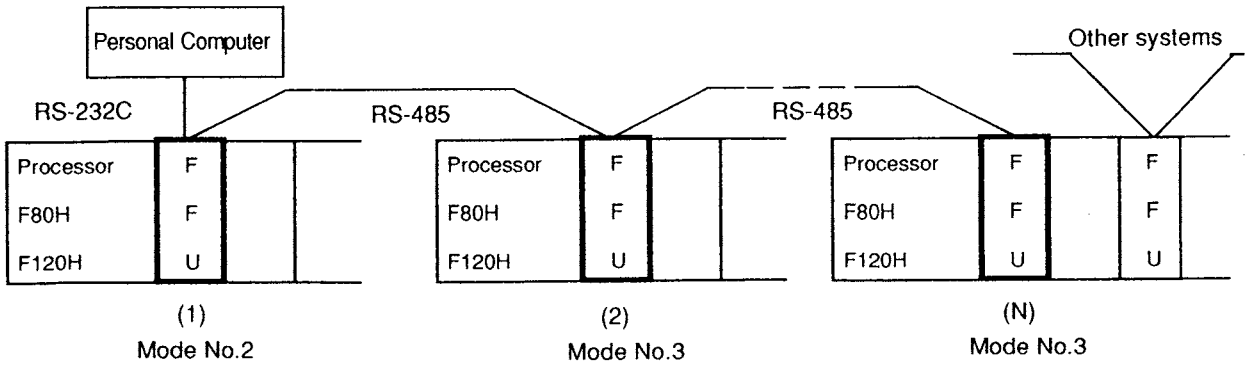
- The printer or the bar code reader, etc. must be equipped with either RS-232C or RS-485.
- If the transmission line uses RS-485, turn "ON" the terminating resistor switch of the RS-485 and also place a resistor (100Ω1W) on the printer or the bar code reader side also.

③ Sample configuration 3, 1 : N transmission system

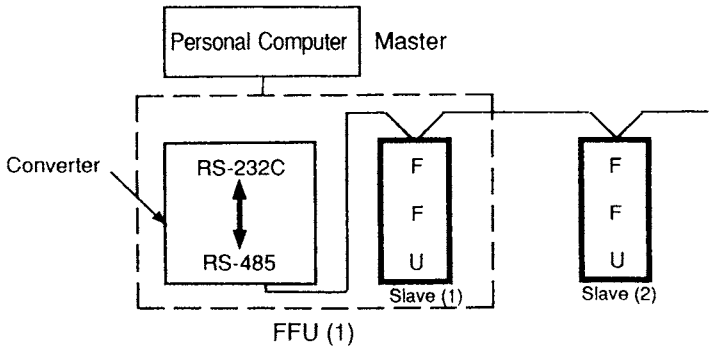
In this system, the personal computer is treated as a master and the FFU as a slave. Connect the personal computer to FFU (1) by the RS-232C for the master construction (as shown on the L/H side of the diagram). When connecting additional FFU modules, connect lines.

Set mode	FFU (1)	: No.2
	FFU (2) to (N)	: No.3

- Transmission is by Command set type.
- Turn "ON" the terminating resistor SW of the RS-485 if FFU is located on ends of the RS-485 connection.



Note) Internal construction of FFU(1) is illustrated below.



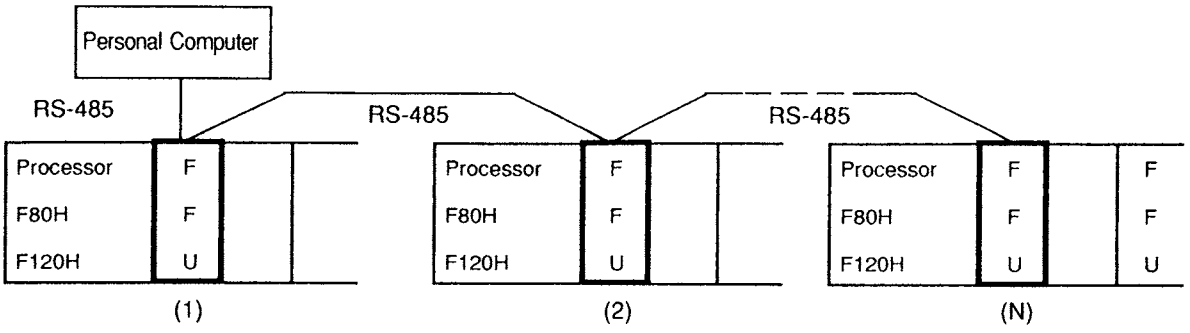
- The FFU to be connected to the personal computer, its built-in converter will actuate.
- All of the FFU's to be connected will be treated as a slave by the personal computer.

④ Sample configuration 4, 1 : N transmission system

This is the same configuration as described in sample configuration 3.
A personal computer must be equipped with RS-485.
FFU will be treated as a slave on RS-485.

Set mode No.3

- Turn "ON" the terminating resistor SW of RS-485 if an FFU is located on the ends of RS-485 connection. Place the terminating resistor (100Ω 1W) on a personal computer side if the personal computer is to be terminated.

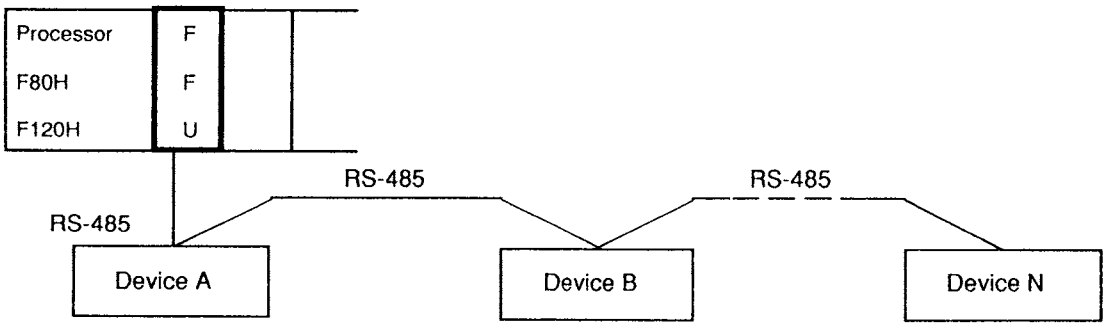


⑤ Sample configuration 5, 1 : N transmission system

In this configuration, FFU (processor) is treated as a master and intelligent devices such as a bar code reader etc. are treated as a slave. Transmission system is by non-procedure method.

Set mode No.5

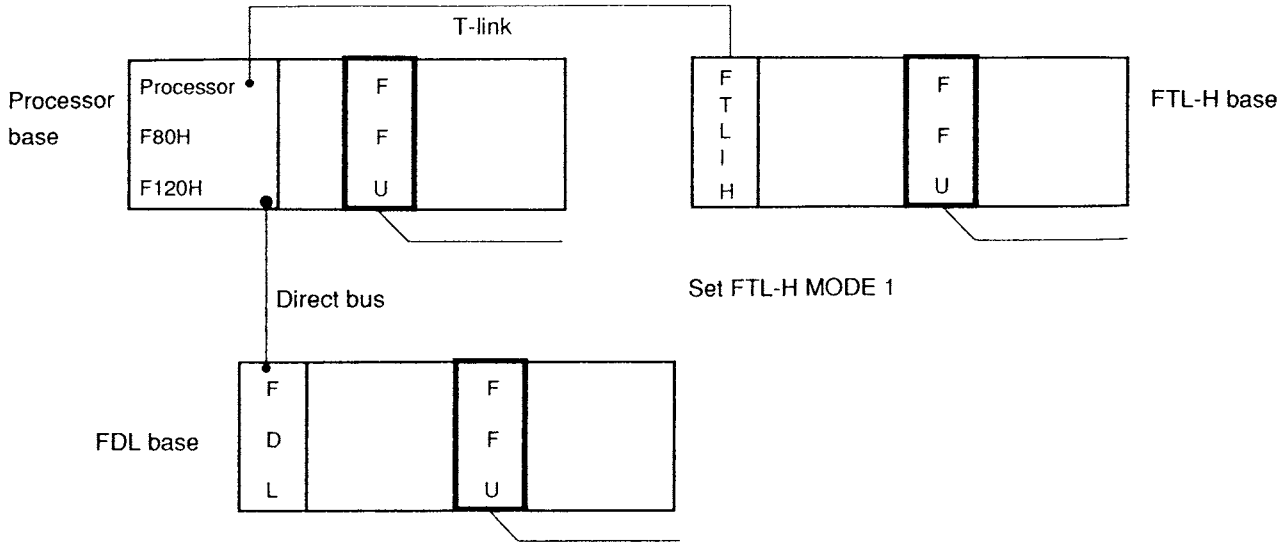
- Turn "ON" the terminating resistor SW of RS-485 if an FFU is located on both ends of RS-485 connection.
  Place the terminating resistor (100Ω 1W) on external devices which are to be terminated.



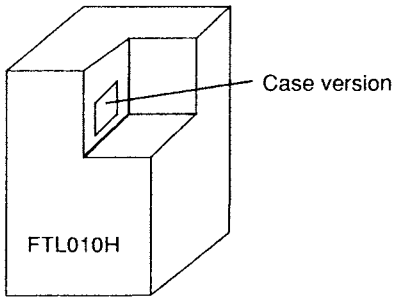
2-2 Note on System Configuration

(1) The system is capable of constructing a maximum of 31 units by RS-485. The "N" describes the number of slaves to be constructed on the system.
(2) Transmission cable can be extended within 15m by RS-232C and 1km by RS-485.
(3) Only the transmission line by RS-485 is capable of constructing 1 : N system. (RS-232C is incapable of constructing the system).
(4) Turn "ON" the terminating resistor of RS-485 for FFU which is to be placed on both ends of RS-485 transmission line. Install a resistor (100Ω 1W) on a personal computer or other external devices when they are to be terminated.
(5) A processor is capable of using several FFU's.
(6) Do not connect an unused port of transmission wire.

2-3 Mounting Location of Processor and FFU



1. The FFU is mountable on any base.
2. The FFU is suitable for processor F80H and F120H only and cannot be mounted on processors F80 / 81, F120 and F200 series.
3. Several FFU's can be mounted, though there are some restrictions to follow according to the total current consumption. (Refer to clause 6-1-2 for details)
4. If using on FTL010H, use FTL010 case version "04B" or later.



Chapter 3

Specifications

3-1 General Specifications

This module is mounted on the base of the processor to be used. However, the specifications marked with **Note** do differ from the MICREX-F processor F80H and F120H.

Item	Specification	
Construction	Panel-mounted type	
Cooling	Self-cooling type	
Ambient temperature Ambient humidity	0 to +50 °C 20 to 90 % RH (no condensation)	**Note**
Storage temperature	-20 to +70 °C	
Atmosphere	Free from corrosive gases	
Vibration	Conforming to JIS C 0911 Crossover frequency 57Hz, 9.8m/s {1G}	
Shock	Conforming to JIS C 0912 test method 1-No.3, 294m/s {30G}	
Noise immunity	1500V p-p, rise time 1ns, pulse width 1μs (noise simulator)	**Note**

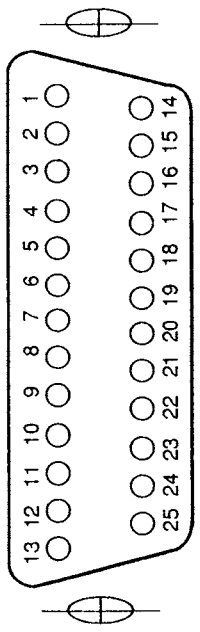
3-2 Basic Specifications

Item			Specification
External Interface	Port		Select RS-232C : 1CH or RS-485 : 1CH at a time. Conversion function is built-in (provided).
	Synchronous method		Start-Stop synchronization
	Transmission speed		300 / 600 / 1,200 / 2,400 / 4,800 / 9,600 / 19,200 BAUD
	Transmission distance		RS-232C : 15m or less RS-485 : 1km or less
	No. of modules		RS-232C 1 : 1 RS-485 1 : 31
	Connection method		RS-232C : D-sub 25p connector RS-485 : Screw terminal block, screw M3.5 6P, built-in terminating resistor can change "ON" or "OFF".
Transmission Specification	Transmission procedure		Non-procedure / non-procedure of command set type
	Control code		JIS in units of 7 (ASCII) and 8, EBCDIC select in units of 8
	Transmission code		Binary data (optional)
	Error control	Hardware	Vertical parity, framing, overrun
		Software	Horizontal parity
	Bit transmitting sequence		Sends in ascending order from low rank bit (from LSB to MSB)
	Message length		Fixed length / variable length, MAX. of 220 bytes (differed by operation mode)
	Start code End code		None, STX, :, :: setup ETX, CR, LF, CR • LF, DLE • ETX, setup
	Character formation		Start bit : 1 bit, data bit : 7 / 8 bit Parity bit : None / Odd / Even, Stop bit : 1 / 1.5 / 2 bit
No. of occupied points			16 points as (1) occupies area WB
No. of slots			1 slot (Processor F80H / F120H and base FDL, FTL-H)
LED indicator	Operation status indicator		POW : Internal power source (+5V) power (Green) RUN : In normal operation (Green) SND : Data is being sent to external devices (Green) RCV : Data is being received from external devices (Green) DVE : Module error (Red)
Internal current consumption			Approx. 500mA (5V)
Mass			380g

3-3 Specification of RS-232C Interface

3-3-1 Connector Pin Layout and Signal Names

Front view



This module has female connectors.
Use male connectors for cable side.

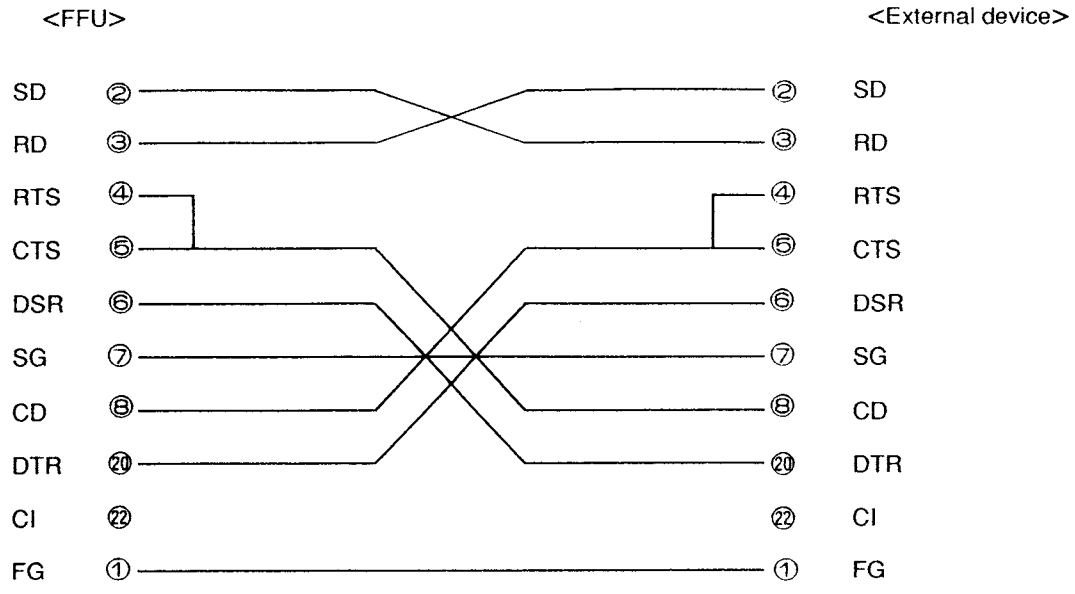
Pin No.	Signal name	Signal flow direction PC - IF External device	Description
1	FG		Frame ground
2	SD	→	Send data
3	RD	←	Receive data
4	RTS	→	Request to send
5	CTS	←	Clear to send
6	DSR	←	Data set ready
7	SG		Signal ground
8	CD	←	Carrier detector
20	DTR	→	Data terminal ready
22	CI	←	Call indication

* The RS-232C interface of this module is according to DTE specification.

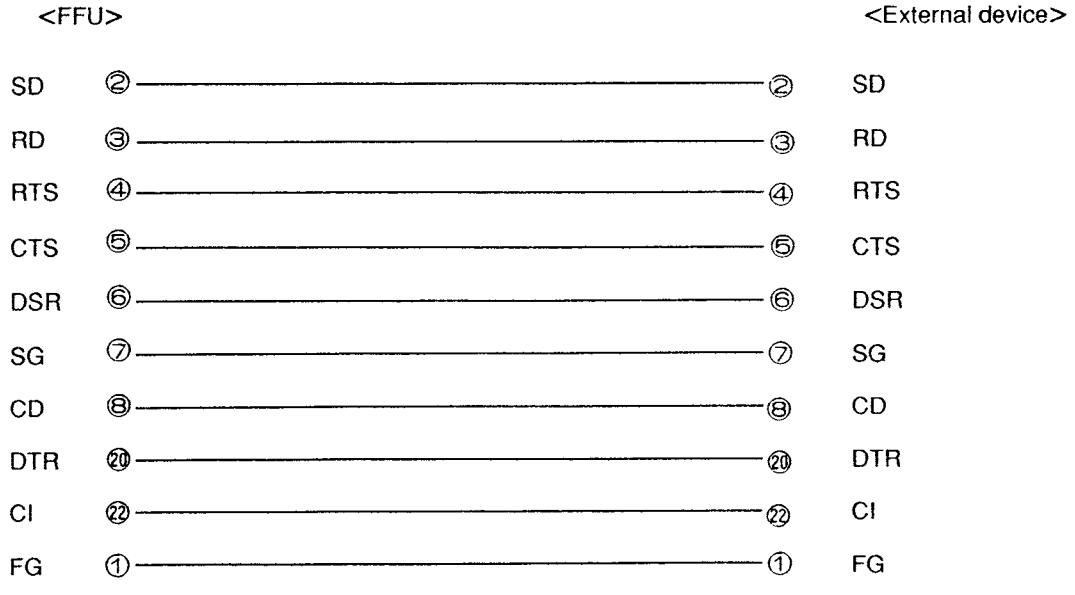
3-3-2 RS-232C Cable Specification

Purchase a connecting cable for external devices according to the cable specifications listed below.

(1) In connection of FFU and specified devices by DTE such as a personal computer, etc.

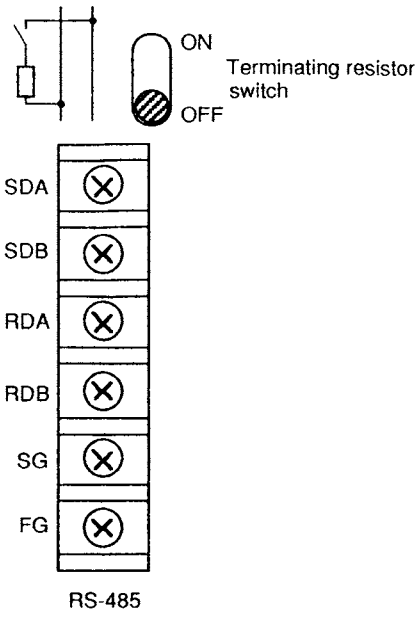


(2) In connection of FFU and specified devices by DCE such as MODEM, etc.



3-4 Specifications of RS-485 Interface

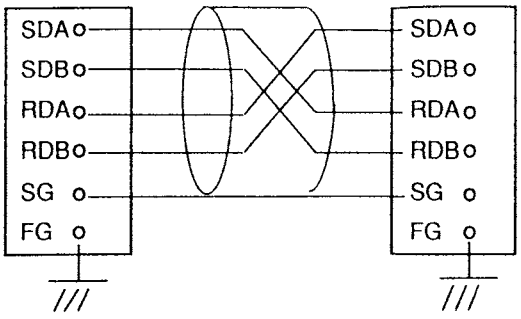
3-4-1 Terminal Layout and Signal Names



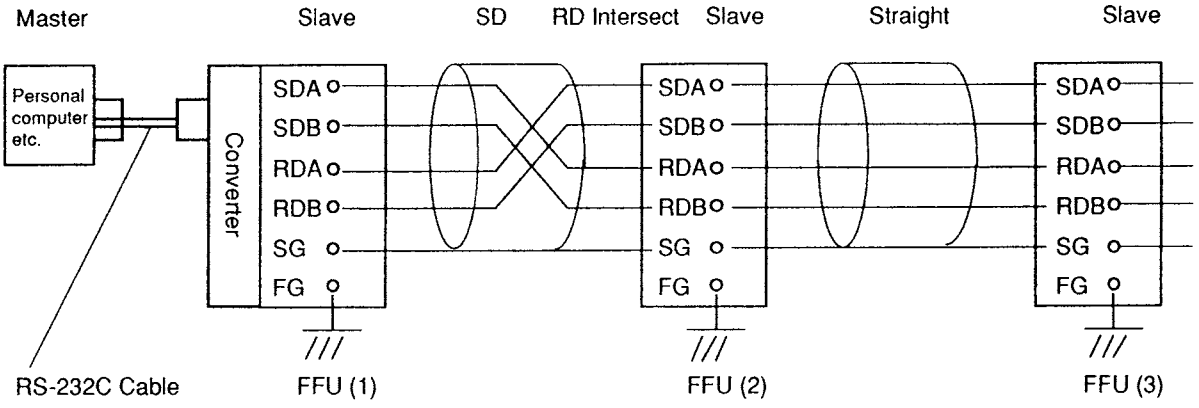
No.	Signal name	Signal flow direction	Description
1	SDA	→	Send data signal wire A
2	SDB	→	Send data signal wire B
3	RDA	←	Receive data signal wire A
4	RDB	←	Receive data signal wire B
5	SG		Signal ground
6	FG		Frame ground

3-4-2 Connecting RS-485 Cable

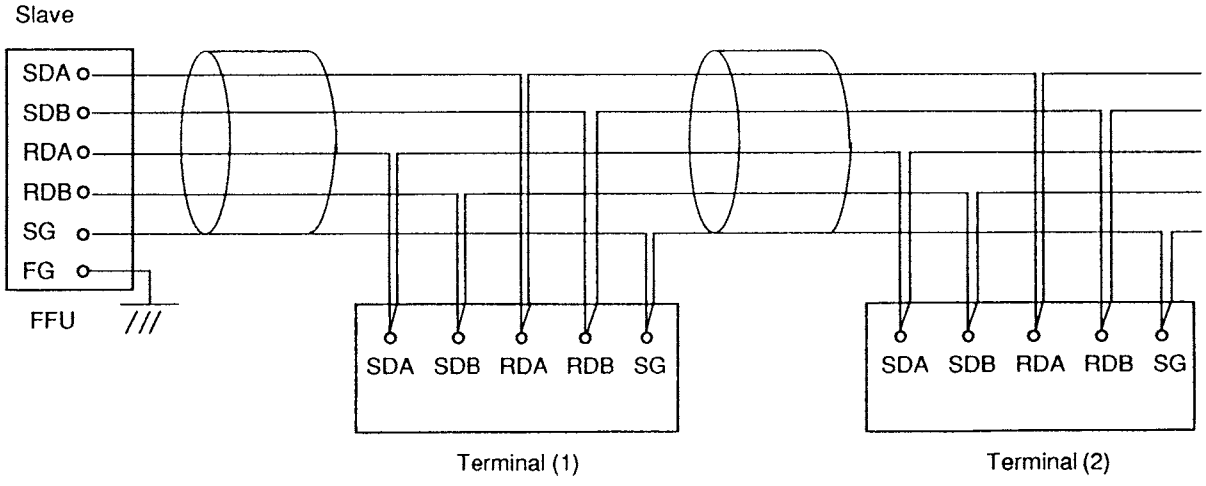
1 : 1



1 : N



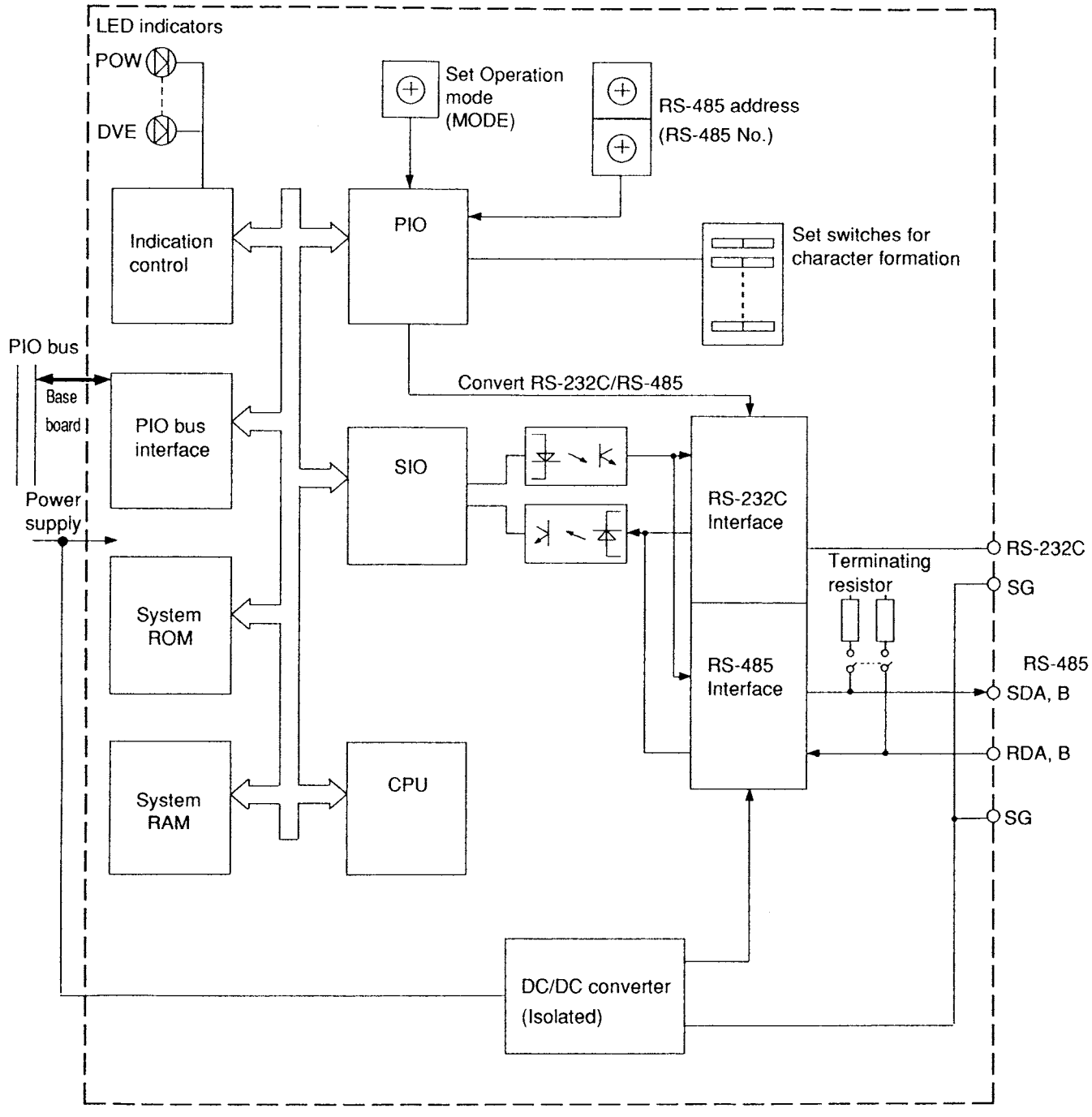
1 : N



Note 1) Use a shielded wire for cable.
Note 2) Turn "ON" the terminating resistor of RS-485 when FFU is to be terminated.
Install a resistor (100Ω 1W) on the personal computer or external devices when they are to be terminated.

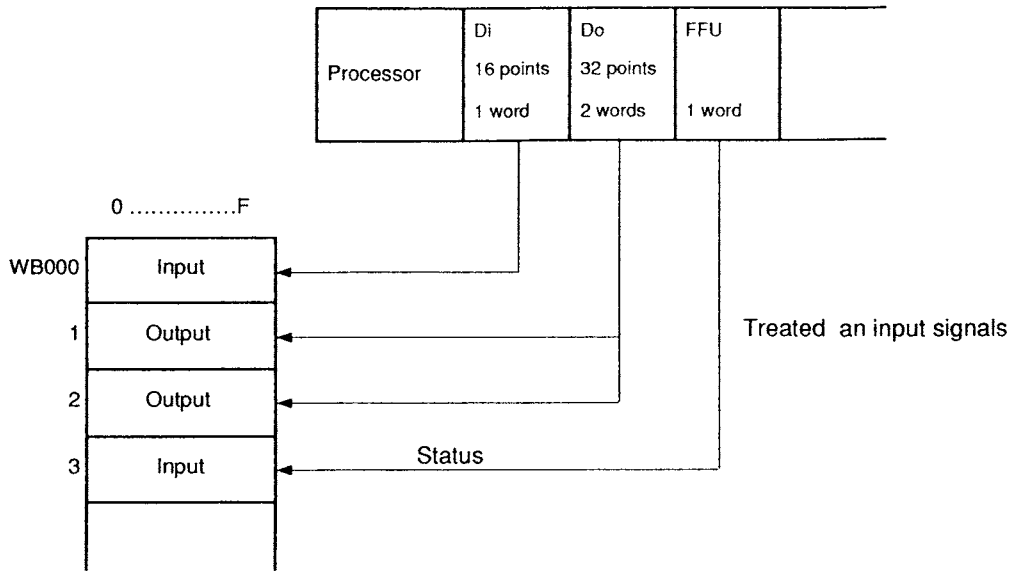
3-5 Internal Configuration

Illustrates the internal configuration of this module.

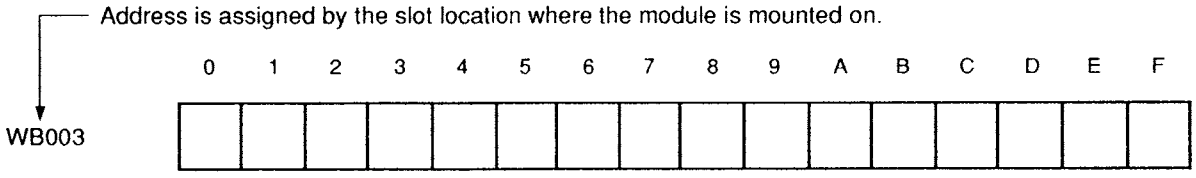


3-6 Input/Output Address Allocation

This module is mounted on the processor and occupies 1 word of input/output area (WB), data from FFU is treated as input signals. This area address is designated by the slot location where the module is mounted on.



Operation status of FFU are informed to these input signals.

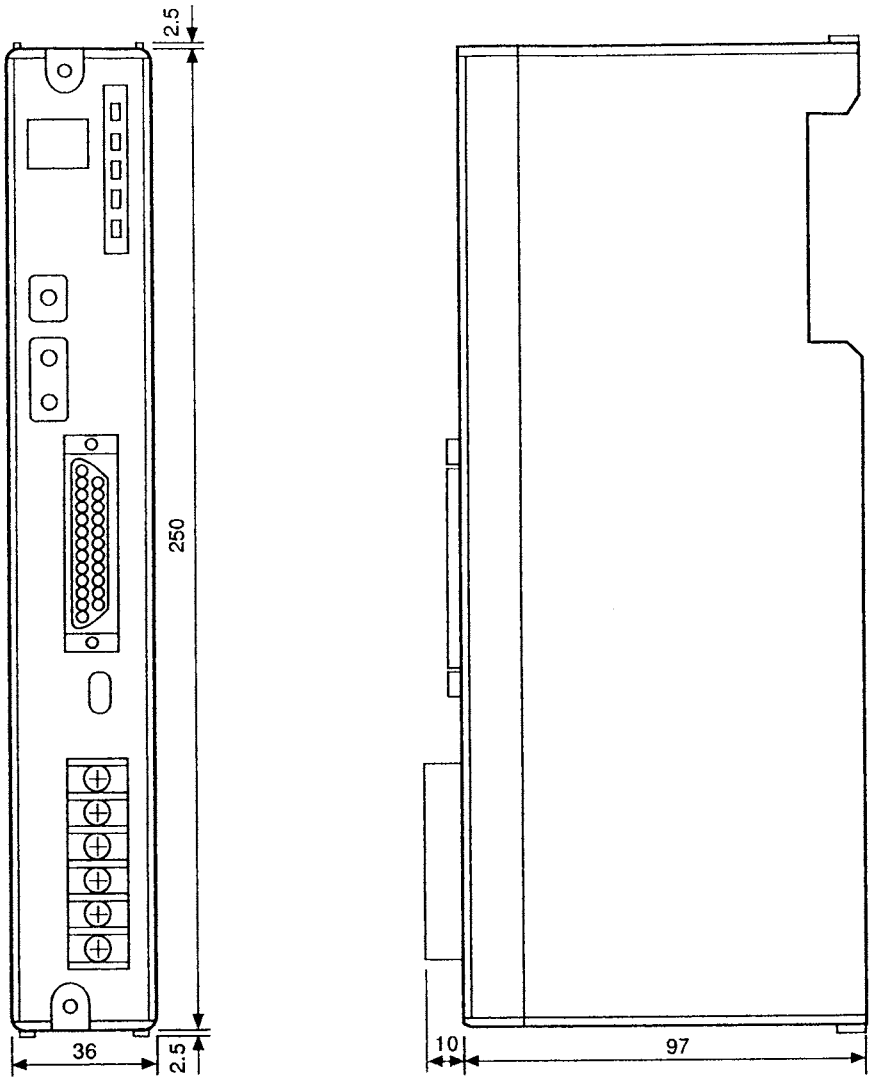


Initial error contents will be given to the area when transferring Initial file, and each signal status and error when transferring data.

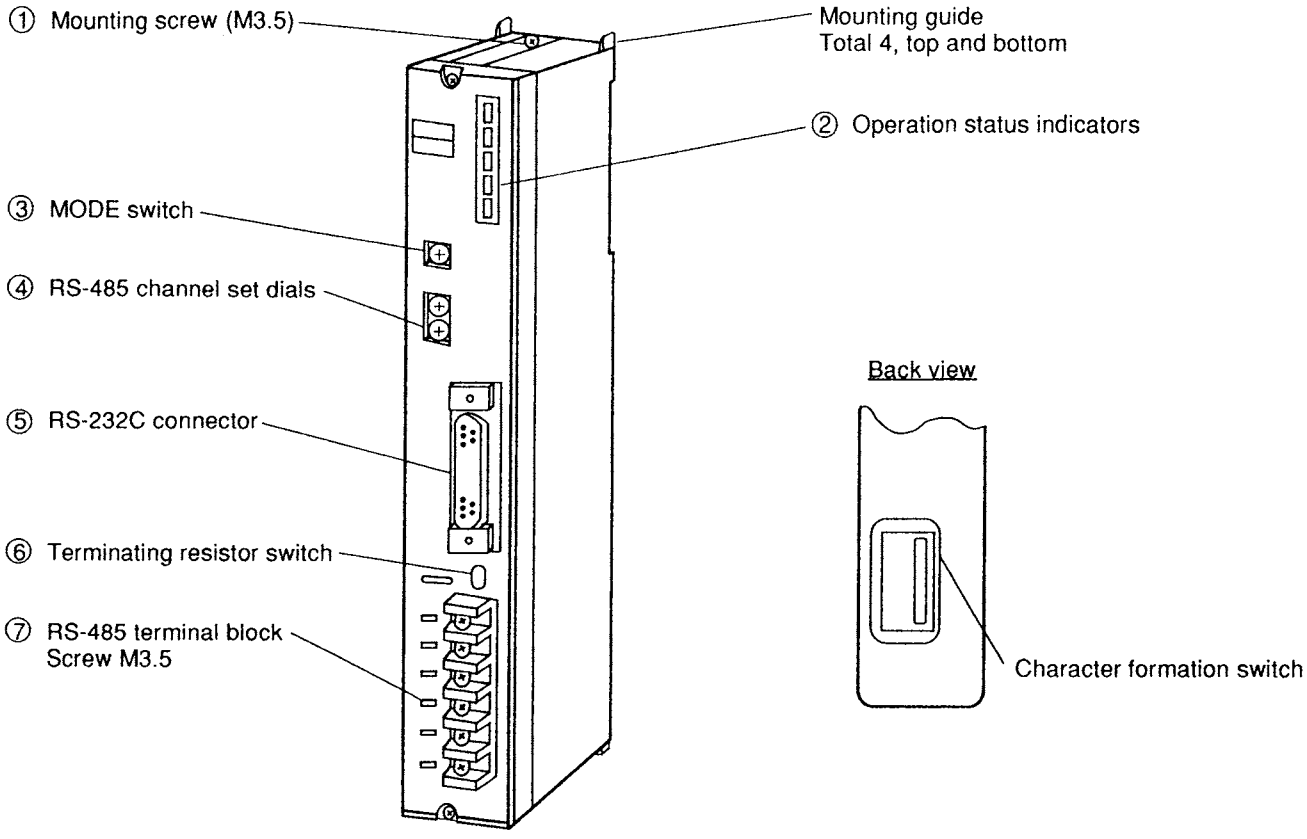
Refer to section 4-7. *Initial Error* and 5-6. *Status Information* for details.

3-7 Dimensions

(Units : mm)



3-8 Names and Functions

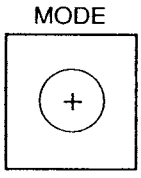


1. **Mounting Screw** (2 of M3.5 screws)
   Tighten screws after mounting the module on the base board. (Top and bottom)

2. **Operation Status Indicators** LED's indicate operation status such as power, operation error, etc. of this module.

LED	Colour	Name	Description
POW	Green	Power	Lit when system power is ON (+5V internal power source)
RUN	Green	Operation	Lit in normal operation
SND	Green	Sending	Lit when data is being sent to external devices
RCV	Green	Recieving	Lit when data is being recieved from external devices
DVE	Red	Error	Lit when hardware error occurs (internal LSI error etc.)

3. **MODE Switch Dial**
   The dial is used to setup the operation modes of FFU. Select one of the operation modes below to setup.



No.1 : Non-procedure of Command set type start-stop synchronization with RS-232C 1 : 1 system.

No.2 : Non-procedure of Command set type start-stop synchronization with RS-232C 1:1 and RS-485 1:N system.

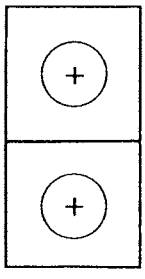
No.3 : Non-procedure of Command set type start-stop synchronization with RS-485 1 : N system.

No.4 : Non-procedure of Start-stop synchronization with RS-232C 1 :1 system

No.5 : Non-procedure of Start-stop synchronization with RS-485 1 : N system

- Refer to section 1-3 for details of each operation mode function and summary.
- Do not adjust to No.0 and 6 to F. (Adjusted to "1" at shipment.)

4. **RS-485 Channel Set Dials**
   Used to adjust channel of the RS-485 transmission line.



Adjust channel when the FFU is used as a slave (N side channel) by the RS-485 in 1 : N system. Channel will be available when the MODE dial is adjusted to NO. 2 or 3 and will be ignored in other MODES.

Adjustable range is within 00 to 99, make certain that there are no duplicate channels existing. (Adjusted to "00" at shipment.)

5. RS-232C Connector

Connector used is D-sub 25 pin. Refer to section 3-3- for details of specification.

6. Terminating Resistor ON / OFF Switch of RS-485 Transmission Line

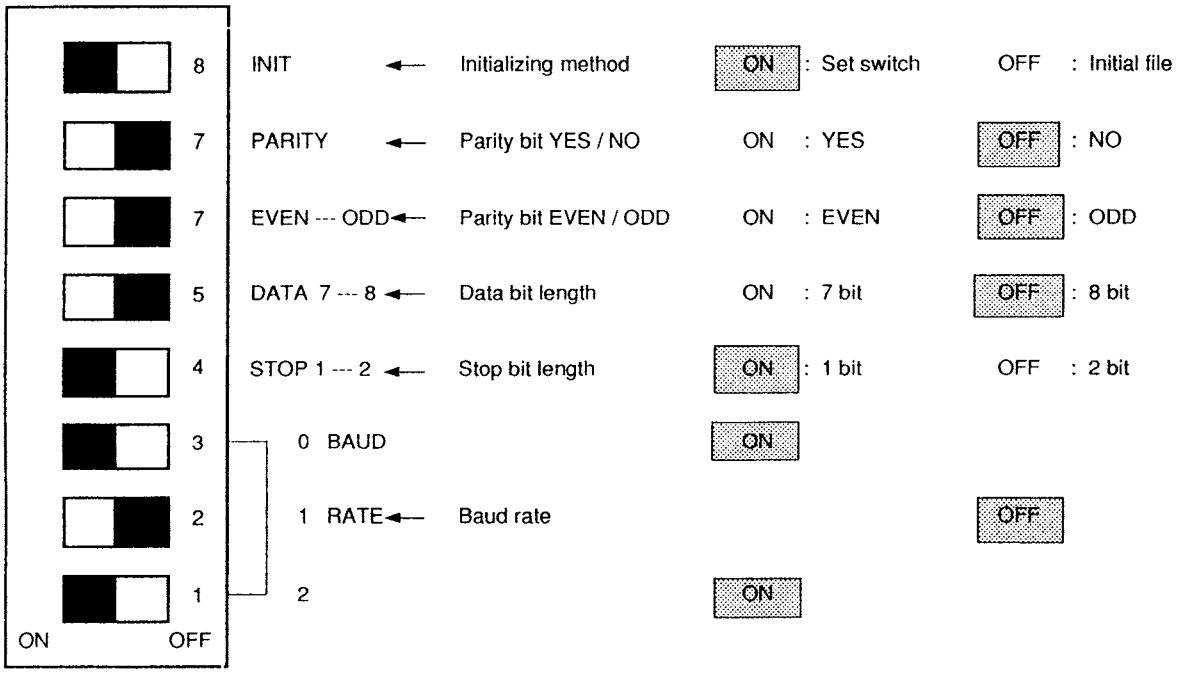
Turn "ON" the terminating resistor switch when FFU is to be terminated on both ends of RS-485. Terminating resistor will be connected on both transmission and reception lines simultaneously. (resistor is "OFF" at shipment)

7. Terminal Block for Connecting RS-485 Transmission Line

M3.5 size terminal screw. (Refer to section 3-4)

8. Character Formation Switch

Dip switches for setting up character formation of RS-232C and RS-485.
Refer to section 4-3 for the setting procedure.



(area are adjusted at shipment.)

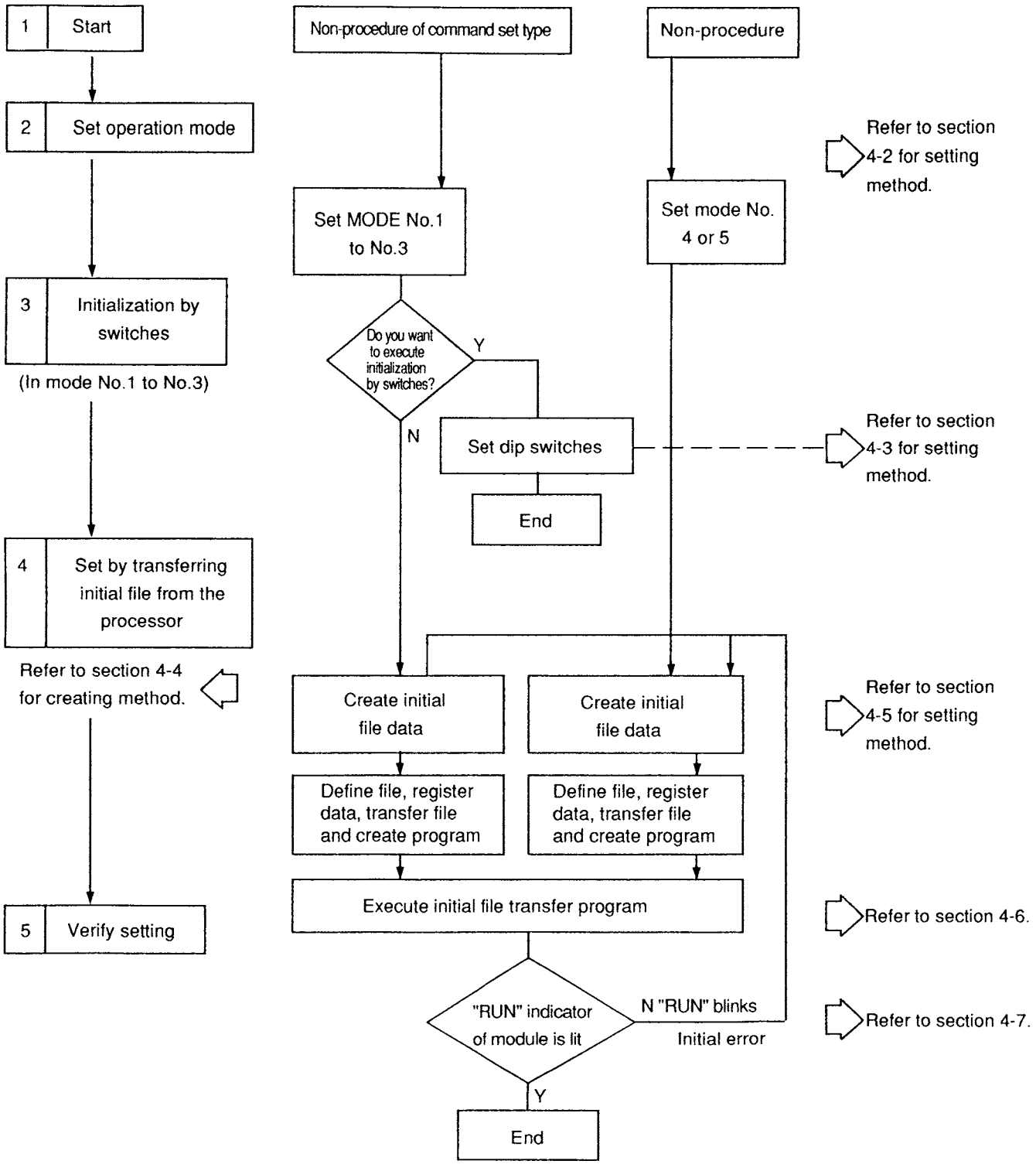
Chapter 4

Initialization

4. Initialization

Transfer Setup data (file) from the set switches of this module and the connected processor for adjusting set value to transmission specifications of external devices to be connected (baud rate and transmission character code, etc.), and proceed with initialization.
Set operation mode first, then create Initialization data (initial file) to set. Acknowledge that the setting method and the initialization data may be altered by operation mode.

4-1 Initialization Procedure



4-2 Setting Operation Mode

Select operation mode according to system configuration to be applied.

Within Mode No.1 to Mode No.5

Adjust a mode out of the "MODE dial 1 to 5" located on the front of the module and never select dial 0 and 6 to F.

Refer to *System Configuration* of Chapter 2 for setting each mode.

4-3 Initialization Items

Preset items to identify transmission procedures of RS-232C and RS-485 for data transmission. Contents of the items are listed on the table of initial file setup (4-1) on the R/H side of the page.

The Item column describes an item to be set and the number column describes the content to be set. Call the numbers when creating file data for initialization and if an unidentified number is set, initial error will occur.

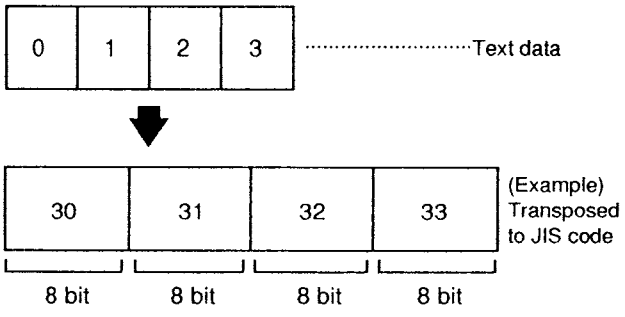
Refer to clause 4-3-2 *"details of initial data"* for details of each item.

4-3-1 List of Initial File Setup

No. / Item		0	1	2	3	4	5	6	7	Initial value
1	Transmission procedure	Non-procedure								—
2	Mode	Initial value	Set							—
3	Receive message No.	Set in operation Mode 4 and 5 only. Set at "0" for the rest of operation.								—
4	Baud rate	300	600	1200	2400	4800	9600	19200		—
5	Data bit	7	8							—
6	Parity bit	None	Odd	Even						—
7	Stop bit	1	1.5	2						—
8	DCE/DTE mode	DCE mode	DTE mode	DTE for MODEM						—
9	CTS/RTS control	RTS is ON/ON in send	Always ON							—
10	DSR/DTR control	Always ON								—
11	Communication condition	DTR is ON/CTS is ON	None/ CTS, DTR are ON	None						—
12	PK access	Refused	Permit	Unable to set in operation mode 4 and 5. Fixed at 0.						0
13	Transmission code	JIS (ASCII)	EBCDIC							0
14	Transposing code	No	Yes							1
15	No. of received data bytes	In operation mode 4 and 5, set No. of bytes for received data by hexadecimal, the rest are set at "0".								—
16	Start code	None	STX	:	::	Set 1	Set 2			1
17	End code	—	ETX	CR	LF	CR • LF	DLE • ETX	Set 1	Set 2	1
18	Start code 1 and 2	Set code by hexadecimal that is figured by the corresponded code selected from set 1 and 2 on item 16.								—
19	End code 1 and 2	Set code by hexadecimal that is figured by the corresponded code selected from set 1 and 2 on item 17.								—
20	BCC	None	Set 1	Set 2						0
21	Location (range)	TEXT	TEXT + End	Start + TEXT	Start + TEXT + End					0
22	Calculation	Add	Add (Invert)	EOR	CRC-16					0
23	Code	Transmission code	BINARY							0
24	Timer	Observation timer for sending, set by hexadecimal								—

4-3-2 Details of Initial Data

No.	Classify	Item	Content
1	Transmission procedure	Non-procedure	There is no procedure for communication with external device.
2	Mode	Default	Operated by initial setup of a module. Set data is listed by numeral value on the right end of table 4-1.
		Set	Operated by the set values of received initial data (listed in section 4-4, 4-5) from processor. its set items are as item 12 to 23.
3	Receive message No.		Set the No. of message module registration in hexadecimal. For example, refer to section 5-5.
4	Baud rate	300 BAUD	Transmitting speed
		600	
		1200	
		2400	
		4800	
		9600	
		19200	
5	Data bit	7	• Number of bits to represent data . 7 formalizes one data by 7 -bit and 8 formalizes one data by 8-bit. • Designate 7-bit when using ASCII code. • Designate 8-bit when using EBCDIC code.
		8	
6	Parity bit	None	• A bit to be added to data for error detection. • Select either odd or even according to personal computer set items.
		Odd	
		Even	
7	Stop bit	1	• A bit to indicate the end of data. • Select one of item 1, 1.5 or 2 according to personal computer set items.
		1.5	
		2	
8	DCE/DTE mode	DCE mode	• If not controlling signal wire, both DCE and DTE will activate simultaneously. • RS-232C connected this module is in DTE specification but can be used in DCE specification by transposing signals as described below. 4th pin (RTS) → CTS 6th pin (DSR) → DTR 5th pin (CTS) → RTS 20th pin (DTR) → DSR • DTE mode for MODEM receives data in ON status of CD. The rest of the signal wires are controlled as DTE mode.
		DTE mode	
		DTE mode for MODEM	
9	CTS/RTS control	RTS ON / ON in transmit	When RTS is ON, CTS is is also ON under the DCE mode. RTS is ON while sending under the DTE mode.
		Always ON	ON always. Turn ON whenever exchanging data to personal computer.
10	DSR/DTR control	Always ON	ON always

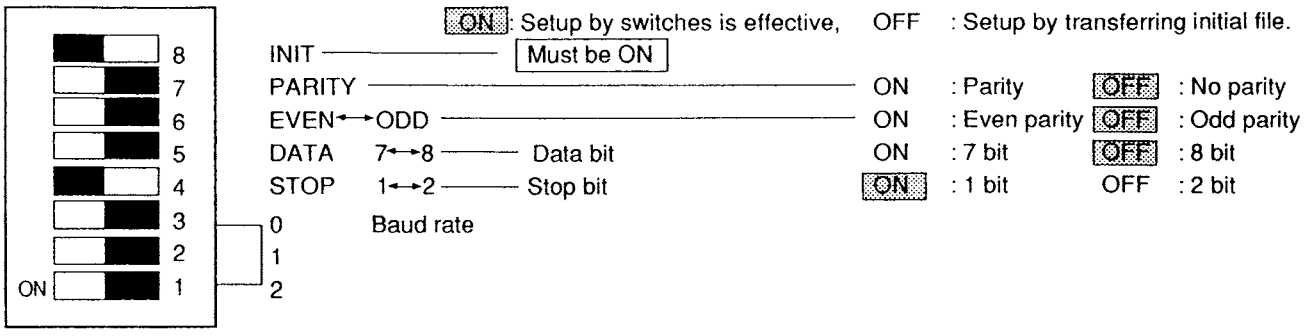
No.	Classify	Item	Content
11	Transmission condition	DTR is ON / CTS is ON	Sends when DTR is ON under the DCE mode. Sends when CTS is ON under the DTE mode.
		None / CTS and DTR is ON	Sends data unconditionaly under the DCE mode. Sends when both CTS and DSR are ON under the DTE mode.
		None	Sends data unconditionaly. (Normally set in this position)
12	PK access	Refuse	Select refuse. In this case, the only written command in this user's manual can be applied. (Read : 00, Write : 01, Transfer : 90)
		Permit	
13	Transmission code	JIS (ASCII)	7 units code (7-bit) or 8 units code (8-bit) by ASCII or JIS C 6220.
		EBCDIC	Extended Binary-Coded-Decimal Interchange Code standerdized by IBM Co., Ltd.
14	Transposing code	No	No code transpose
		Yes	Transpose Text data to Character data. Numeric value of Character data according to transmission code (JIS, ASCII or EBCDIC). Transposable data are "0 to 9, A to F". 
15	No. of bytes received	0 : Variable length 1 to D8 : Fixed length	• Set it in operation mode 4 or 5. • Set No. of received data bytes by hexadecimal. • 216 bytes or less can be set. • Data will be variable length when "0" is set, thus when an end code is received, receiving will be complete. • For more details,refer to Appendix.
16	Start code	None	A code to be added on start of text. Select " : " symbol as start code normally.
		STX	
		:	
		: :	
		Set 1	
		Set 2	
17	End code	—	A code to be added on next to text or (Text + error check) that describes end of data transmission. Select "CR" normally.
		ETX	
		CR	
		LF	
		CR • LF	
		DLE • ETX	
		Set 1	
		Set 2	

No.	Classify	Item	Content
18	Start code 1 and 2		If setting 1 byte of start code, select Set 1, ans 2 bytes of start code, select Set 2 from item 16th. In this case of selecting Set 2, set a byte in order from start code 1 to 2. When transmission code ASCII is selected, and if " * " is set as head code, set " 2A " of ASCII code instead of " * ".
19	End code 1 and 2		If setting 1 byte of end code, select Set 1, ans 2 bytes of enf code, select Set 2 from item 17th. In this case of selecting Set 2, set a byte in order from end code 1 to 2. When transmission code ASCII is selected, and if " * " is set as head code, set " 2A " of ASCII code instead of " * ".
20	BCC	None Set 1 Set 2	These items for selecting use of horizontal parity to check transmission data error of text. Set 1 : [High byte of BCC][Low byte of BCC] Set 2 : [Low byte of BCC][High byte of BCC] * For more details, refer to Appendix.
21	Location (range)	TEXT TEXT + END Start + TEXT Start + TEXT + End	Set the location of BCC and range to be calculated. TEXT [Start code][TEXT][BCC][End] TEXT + End [Start code][TEXT][End][BCC] Start + TEXT [Start][TEXT][BCC][End] Start + TEXT + End [Start][TEXT][BCC][End] ⟷ Range to be calculated
22	Calculation method	Add Add (INVERT) EOR CRC-16	Calculation method used to describe how to check for transmission error. [D1][D2] … [DN] Add : D1 + D2 ..... + DN Add : (INVERT) : (D1 + D2 .....+ DN) VX' FF' EOR : D1VD2V ..... VDN CRC-16 : $x^{16} + x^{15} + x^2 + 1$
23	Code of BCC	Transmission code	Set BCC code Transpose BCC data to transmission code. Unnecessary to set in calculation CRC-16 (Initial error). Ex..) [1][2] ➡ [" 1 "][" 2 "] 1 byte 2 byte
		BINARY	Result of data calculation. BCC must be placed after end code; otherwise, initial error will occur.
24	Timer		• A timer to observe transmission from FFU has a request to send data to RS-232C circuit until transmitting is complete. • Normally set on 100 (0.1 per sec.) • Set by hexadecimal. Transmission error relay will be turned ON by exceeding of the observation timer. Sample 64 (16) ⟶ 100 (10) = 10 sec. 32 (16) ⟶ 50 (10) = 5 sec. 14 (16) ⟶ 20 (10) = 2 sec.

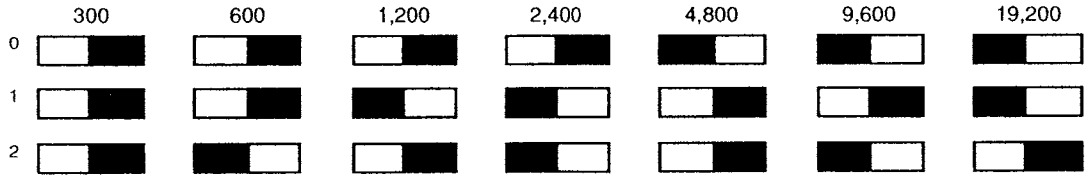
4-4 Initialization by Switches (For mode No.1 to No.3)

Uncomplicated initialization can be performed. If transmission specifications of external device (personal computer, etc.) to be connected are an approximation, it is unnecessary to create the initial file when setting up by the switches.
The following setting can be selected by dip switches located on the back of this module. The remaining items are preset. (Unable to be changed.) Setup must be done before turning the power "ON".

4-4-1 Definition of Set Switches



(area are adjusted at shipment.)



Note) Transferring the listed initial file in section 4-5 is ineffective under the initialization by the switches. (INIT : ON)
However, after initial file is transferred, the announced relay of transmitting complete will be activated as transmitting success normally, but the file data is ignored.
(Adjusted to 9,600 BAUD at shipment)

4-4-2 Setting Up Control Items

This module preset as listed items on the right beside setup listed in previous clause.

This module reads the preset values when the power is turned "ON", and sets the values then the RUN LED is lit.

Turn the power "OFF" when modifying setup. After completion, turn the power "ON" again.
Status information bit No.6 in section 5-6 will actuate for verification of setup.

DCE / DTE : DCE
CTS / RTS : Always "ON"
DSR / DTR : Always "ON"
Transmitting condition : None
PK access : No permit
Transmission code : JIS (ASCII)
Transpose code : Yes
Start code : :
End code : CR • LF
BCC : None
Timer : 25.5 seconds

4-5 Initial File 1 Mode No.1 to 3

Create the following file by forming the initialization items listed in clause 4-3-1, as shown below, and register.

4-5-1 Format of Initial File 1 Mode No.1 to 3

Define 11 words of file and line up the initialization items listed in clause 4-3-1 in ascending order. The written numbers in parenthesis describe item number of initial file.

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	Transmission procedure			(1)	Mode			(2)	Unused							
1	Baud rate			(4)	Data bit			(5)	Parity bit			(6)	Stop bit			(7)
2	DCE/DTE			(8)	CTS/RTS			(9)	DSR/DTR			(10)	Transmission condition			(11)
3	PK access			(12)	Transmission code			(13)	Unused				Code transposition			(14)
4	Unused								Start code			(16)	End code			(17)
5	Start code 1							(18)	Start code 2							(18)
6	End code 1							(19)	End code 2							(19)
7	BCC			(20)	Location (range)			(21)	Calculation			(22)	Code			(23)
8	Timer							(24)	Unused							
9	Unused															
10	Unused															

Note) Set to "0" on unused section.

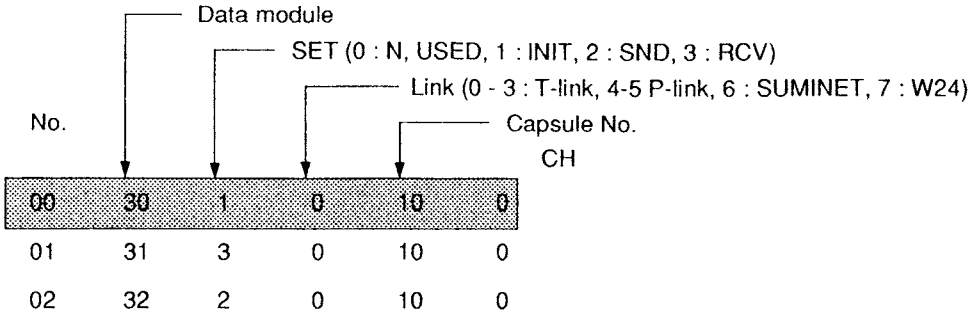
Note) Set each item by hexadecimal.

4-5-2 Initial File Registration

Define a file to register the written file above on the processor and create an initial file by Define data table command (TABLE), and Initialize by transferring it to this module when the power is turned "ON".

This example illustrates the use of File No.30 (data module) under address WB10 is assigned for this module by system define. (Message module registration.)

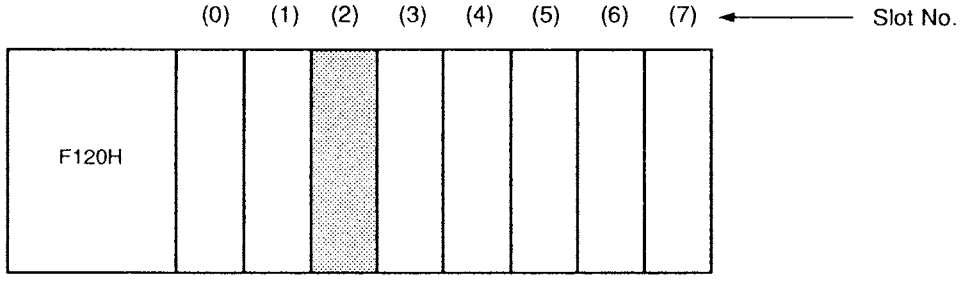
Message module registration

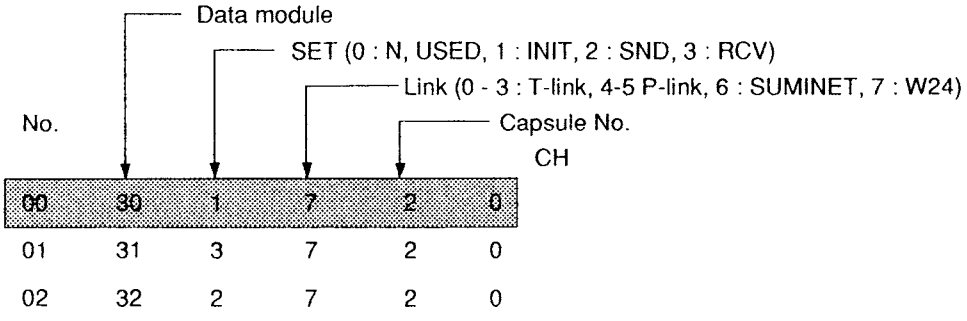


Refer to user's manual (LEH915) for registration and operation, according to sample of Program Loader (LITE).

Remarks) Link and capsule No. of Message module registration in Direct access mode are as following illustrations.

1. Designate 7 for the link (W24).
2. Designate the capsule No. according as slot No. of this module.





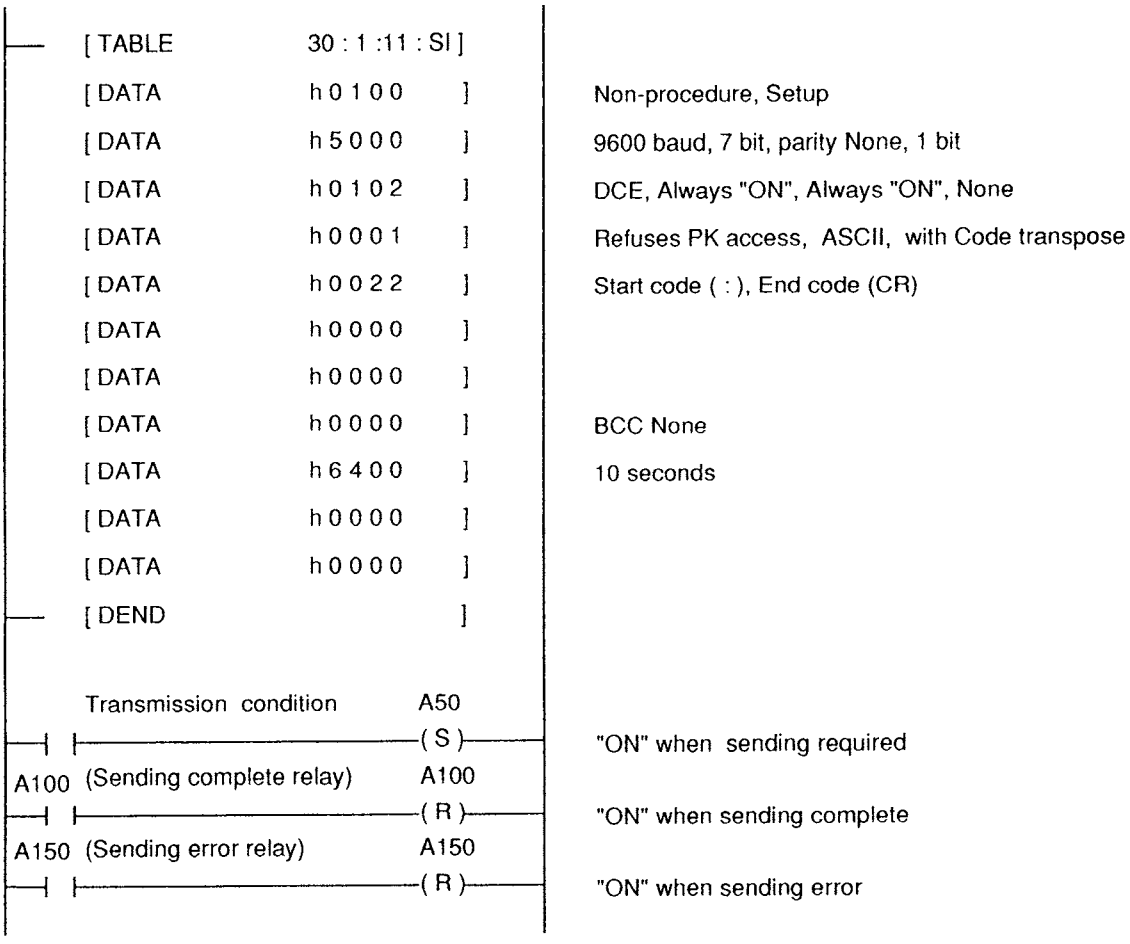
4-5-3 Sample of Initial Program 1

Register data on file No.30, and shows a sample program to be transferred to this module. Transfer data by Message communication. Transfer has begun by Transmission condition.

Note 1) Surely turn "OFF" the character formation switch INIT of this module.
Note 2) Make sure that the data transfer is executed before turning the power "ON". The initialized contents of this module will be erased if the power is turned "OFF".

Refer to section 5-6 when and if an error occurs by transferring. (RUN indicator of this module flickers.)

Sample of initial program



Note 1) It is for convenience to apply the initialization table listed in appendix 5 when creating the initial program.
2) Initial file must be transferred by Message transmitting. Message communication command (MSGT) can not be applied.
3) Initial file according to type SI (binary 16 bit length).
4) While Relay complete is "ON", the next sending required will not be accepted.
5) If TABL command is created next to program PEND, processing time will be shortened.

4-6 Initial File 2 Mode No.4 and No.5

Create a file by lining up the initialization items, listed in clause 4-3-1, in ascending order and register. This format is basically the same as section 4-5 except for one section that differs from the files format.

4-6-1 Format of Initial File 2 Mode No.4 and No.5

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	Transmission procedure			(1)	Mode			(2)	Receive message No.							(3)
1	Baud rate			(4)	Data bit			(5)	Parity bit			(6)	Stop bit			(7)
2	DCE/DTE			(8)	CTS/RTS			(9)	DSR/DTR			(10)	Transmission condition			(11)
3	Unused				Transmission code			(13)	Unused				Code transposition			(14)
4	Receive data length							(15)	Start code			(16)	End code			(17)
5	Start code 1							(18)	Start code 2							(18)
6	End code 1							(19)	End code 2							(19)
7	BCC			(20)	Location (range)			(21)	Calculation			(22)	Code			(23)
8	Timer							(24)	Unused							
9	Unused															
10	Unused															

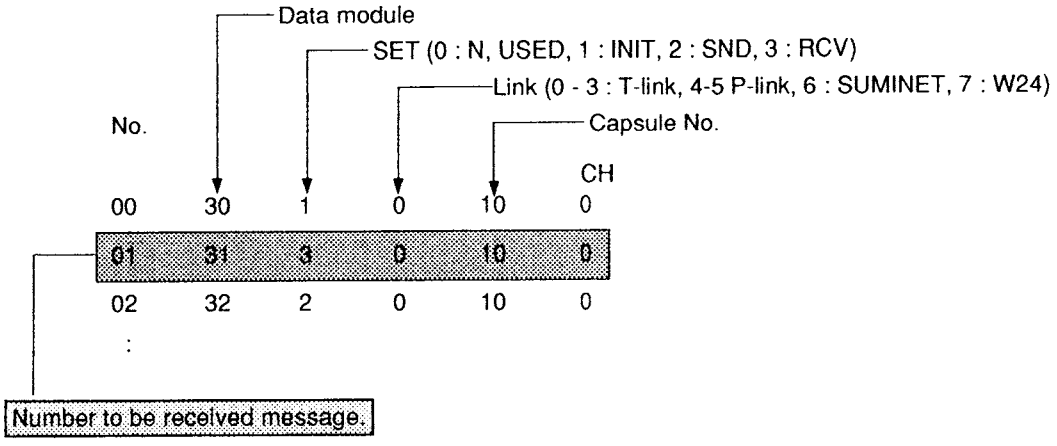
Note) Set to "0" on unused section.
Note) Set each item by hexadecimal.

4-6-2 Initial File Registration

Create initial file by TABL (define data table command) and transfer it to initialize. This process is the same as clause 4-5-2.

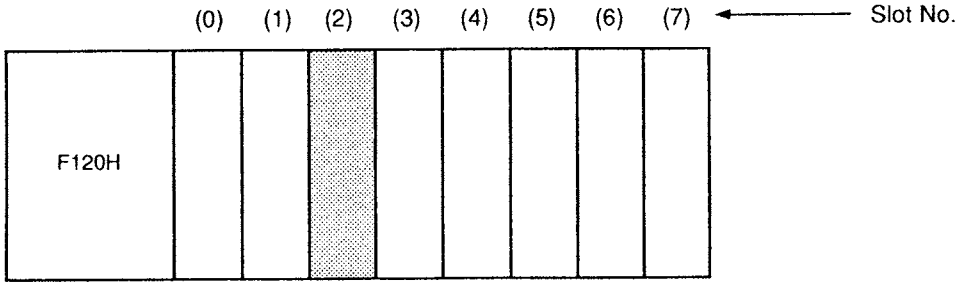
This example illustrates the use of file No.30 for initial file and file No.31 for receiving under the mounted module on the base that is addressed to WB10 by system definition (message module registration).

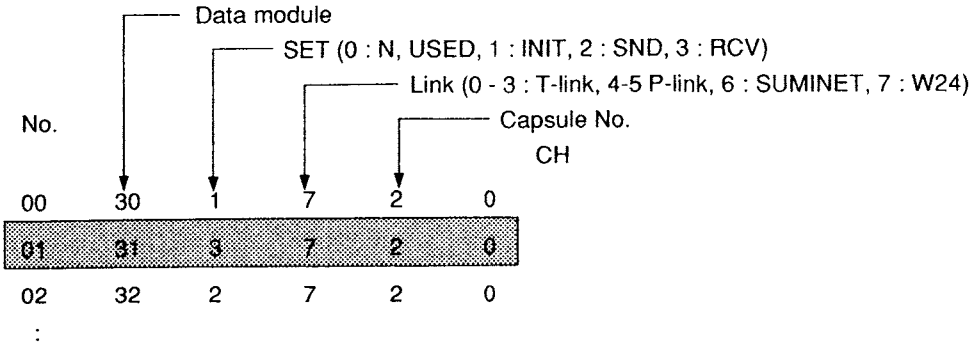
Message module registration



Remarks) Link and capsule No. of Message module registration in Direct access mode are as following illustrations.

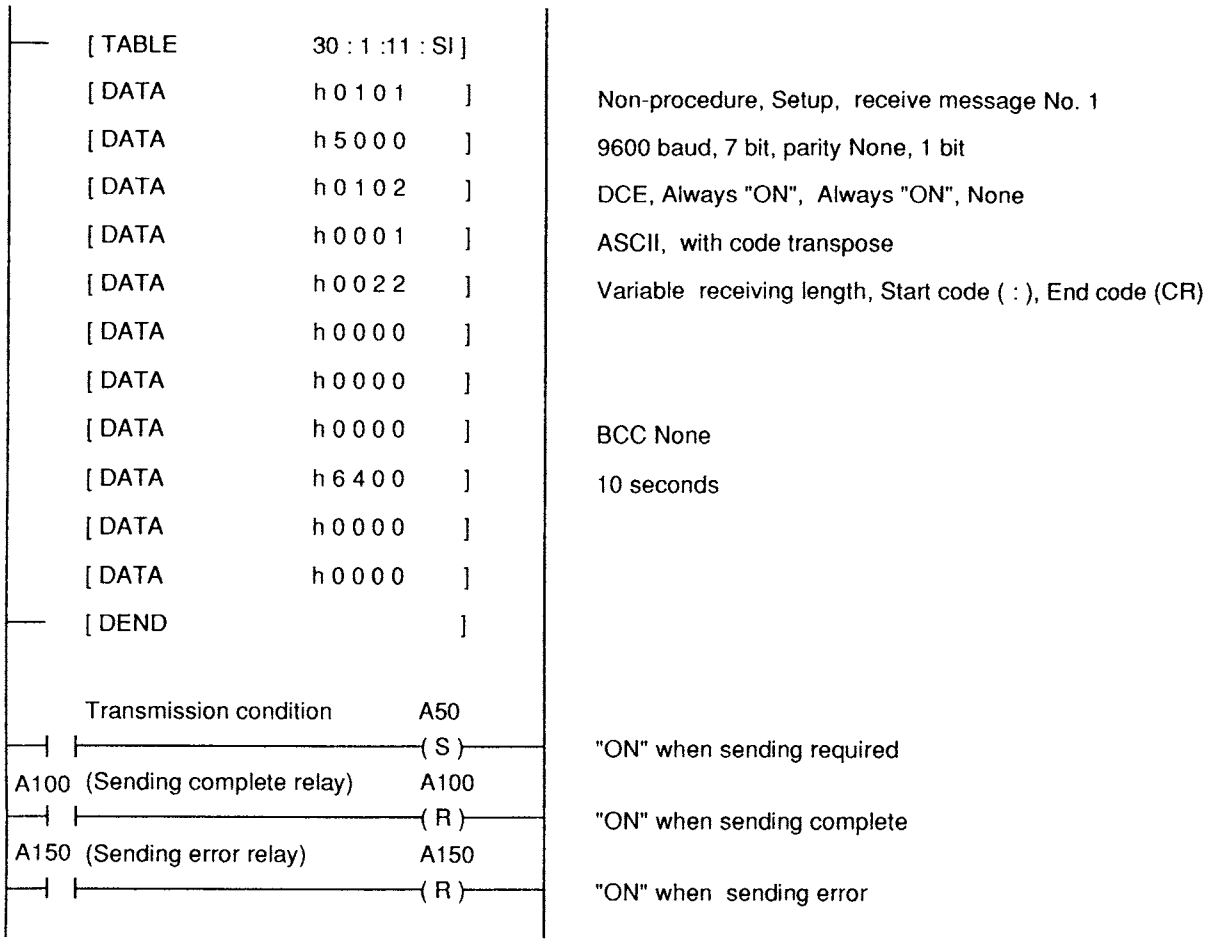
1. Designate 7 for the link (W24).
2. Designate the capsule No. according as slot No. of this module.





4-6-3 Sample of initial Program 2

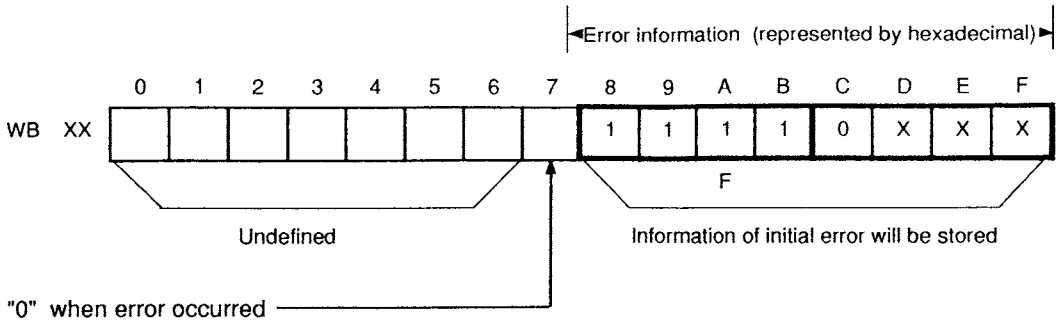
Register data in file No.30 and shows a sample program that is to be transferred to this module. This program is created the same as in clause 4-5-3.



Note 1) It is for convenience to apply the initialization table listed in appendix 5 when creating the initial program.
2) Initial file must be transferred by Message transmitting. Message communication command (MSGT) can not be applied.
3) Initial file according to type SI (binary 16 bit length).
4) While Relay complete is "ON", the next sending required will not be accepted.
5) If TABL command is created next to program PEND, processing time will be shortened.

4-7 Initial Error

If data to be sent for initializing this module by the MICREX-F as prescribed is not formatted regularly , the RUN indicator of this module will blink. Check for errors according to the following error contents that are stored on area WB of the processor and modify errors until the RUN lump is lit (Not blinking).



No.	Content	Countermesure
00	Normal	
F0	Set area error	Check the set area and modify it correctly.
F1	BCC proceded the End code and is represented by BINARY. (Location = 0 or 2, Code = 1)	Set BCC after End code when BCC is represented by BINARY.
F2	BCC preceded the End code and is set on CRC-16. (Location = 0 or 2, Calculation = 3)	Set BCC after End code.
F3	CRC-16 is set on treansmitting code. (Calculation = 3, Code = 0)	CRC-16 is represented by BINARY.
F5	No End code is set. (End code = 0)	Set End code.
F6	EBCDIC code is designated, however it is 7-bit data length. (Data bit = 1, Transmitting code = 1)	Modify the number of data to 8-bit.

Note 1) All of modes (No.1 to No.5) have common initial errors.

2) Bit 7 represents "0" when error occurred, and error informations are stored onto bit 8 to F. When system returns to normal status, bit 7 is turned to "1" and bit 8 to F have are switch to Input informations from error informations.

4-8 Initialization for External Device

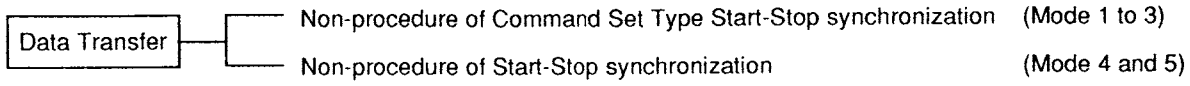
Adjust interface specification (RS-232C, RS-485) of external devices to be connected to this module, according to the previously adjusted transmission specifications and activate. Adjusting methods differ from one external device to another. Refer to each external devices manual for correct adjusting.

Chapter 5

Data Transmission

5-1 Data Transmission Summary

Data transmission is divided into 2 methods.



- **Non-procedure of Command Set Type Start -Stop Synchronization**

  This procedure has the fixed data format (text format) and is specified for connection with a personal computer. Refer to section 5-3 for details of text format.

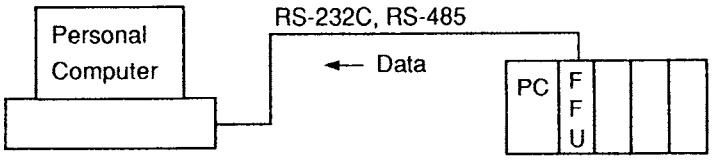
- **Non-procedure of Start- Stop Synchronization**

  This procedure is applicable to devices that have the built-in RS-232C or RS-485 interface function (enabled by free data format).

5-2 Data Transmission Functions

Three commands are applied for reading data or writing of the processor via this module.

1. Read Command



When read command is issued from a personal computer, the module reads internal memory of MICREX-F (PC). Current value of timer, counter and ON/OFF status of relay, etc. can be observed.

This function is available when any of mode 1 to 3 are selected.

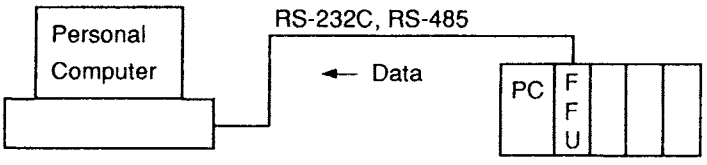
2. Write Command

When write command is issued from a personal computer, the module writes data in the internal memory of MICREX-F (PC). Set value of timer or counter, etc. can be modified.

This function is available when any of mode 1 to 3 are selected.

3. Transfer Data Command

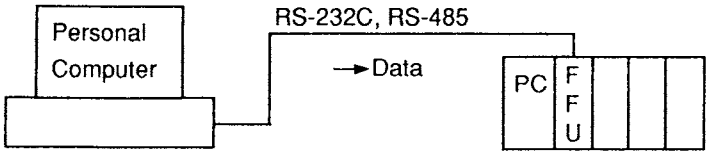
(a) To personal computer from MICREX-F



This command transfers memory content of MICREX-F (PC) to a personal computer. The contents is transferred by sequence program when the request relay is turned "ON".

This function is available when any of mode 1, 4 and 5 are selected.

(b) To MICREX-F from Personal computer



This command transfers memory content of MICREX-F (PC) from a personal computer, etc.

This function is available when any of mode 1, 4 and 5 are selected.

5-3 Text Format

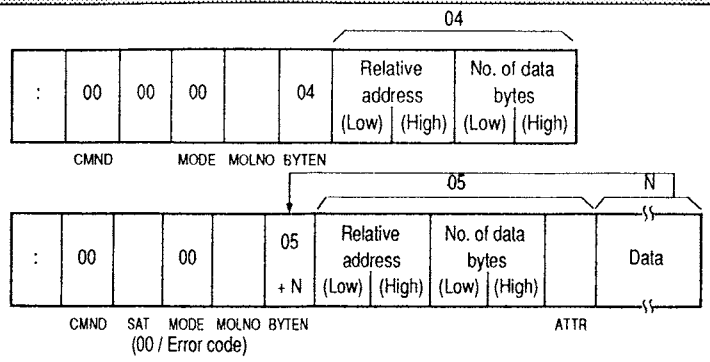
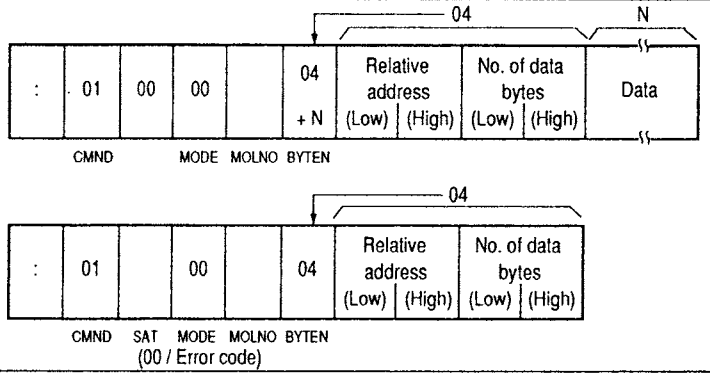
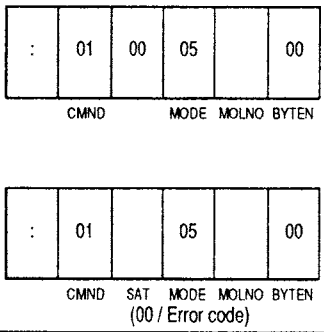
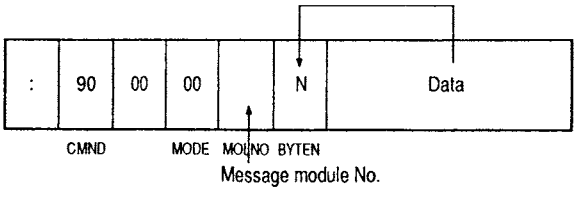
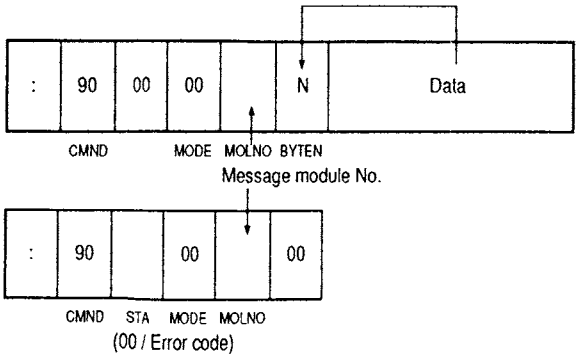
When using any of Mode 1 to 3 for transmitting data to a personal computer, text format for data to be transmitted is defined. Set request items according to the defined text format. The text is divided into a header section and a data section.
Header section includes command to designate operation of side received text and module No. (MOLNO) to process data. Also, when command is issued from personal computer, processed result (STA) is included in Reply text to the personal computer. Data section will be added corresponding with command (such as data transfer being transferred data).

Term	Content	Reference
CMND	Command. Text receiving side follows the command for operation.	Page 5-5
RSNO	Enter address by BCD for FFK to be corresponded when using the RS-485. Assign address 00 when not using RS-485 (Transfer command will be refused when RS-485 is used.)	——
MODE	Mode. Discloses operation details.	Page 5-5
MOLNO	Informs Module No. that corresponds for reading operation when Read Write command is issued. Also discloses message No. that corresponds for Data Transfer command.	Page 5-6
BYTEN	Discloses No. of data bytes until End code. Set in hexadecimal.	——
ATTR	Discloses attributes of this module (refer to clause 5-3-3 and 5-3-4 for details).	Page 5-6 and 5-7
STA	Discloses command processing status (as Normal/Error) when replying from this module if command is issued from a personal computer.	Page 5-7

Restrictions on "N" to be set on BYTEN
1. Number of words x 2 is "N" for 16 bit area.
2. Number of words x 4 is "N" for 32 bit area.

5-3-1 List of Text Formats

Illustrates text formats of Read / Write data and Transfer data on the table below.

Text	Command	Mode	Data flow	Text format	Remarks
Read	00	00	Personal computer to M-F (Transmit) M-F to Personal computer (Receive)		Command to read contents of assigned module.
Write	01	00	Personal computer to M-F (Transmit) M-F to Personal computer (Receive)		Command to write contents on the assigned module.
	01	05	Personal computer to M-F (Transmit) M-F to Personal computer (Receive)		Command to clear the contents of assigned module.
Data transfer	90	00	M-F to Personal computer (Receive)		
	90	00	Personal computer to M-F (Transmit) M-F to Personal computer (Receive)		

5-3-2 List of Command and Mode

Command is represented by hexadecimal that is a designated number for Receive data side to do a job when communicating data between MICREX-F to a personal computer. Furthermore, MODE is to designate command specifically. The contents of command and mode are listed below.

CMND (Hexadecimal)	Command name	MODE	MODE name	Description
00	Read	00	Read address	Reads data from designated address out of designated Module No. Maximum 212 bytes of data can be read at a time.
01	Write	00	Write address	Writes data in designated address of designated Module No. Maximum 220 bytes of data can be written at a time.
		05	Clear	Clears designated Module.
90	Data transfer	00	Transfer	Describes as data transmission from user's program of the processor when data is transferred from this module to a personal computer. Stores data in message module on processor corresponded with message No., then corresponding complete relay will be set when data is transferred from the personal computer to this module. When applying this command, preregister a message module by loader; otherwise it cannot be applied. Maximum 220 bytes of data can be transferred at a time.

5-3-3 List of Module No.

MOLN (Hexa-decimal)	Symbol	1 word length (bit)	Module attribute		Applicable processor	
					F80H	F120H
00	B	16	01		○	○
01	M	16	01		○	○
02	K	16	01		○	○
03	F	16	01		○	○
04	A	16	01		○	○
05	D	16	01		○	○
09	W9	32	02		○	○
0A	TS	32	02		○	○
0B	TR	32	02		○	○
0C	CS	32	02		○	○
0D	CR	32	02		○	○
0E	BD	32	02		○	○
14	WL	16	01		—	(Note)
15	W21	16	01		—	(Note)
16	W22	16	01		—	(Note)
17	W23	16	01		—	(Note)
18	W24	16	01		○	○
1E to 6D	W30 to W109	16	SI	03	○	○
		32	DI	04		
			BD	02		
78	W120	16	01		—	(Note)
79	W121	16	01		—	(Note)
7A	W122	16	01		—	(Note)
7B	W123	16	01		—	(Note)

(Note) Employable when P-link card is mounted on optional slot of F120H.

5-3-4 List of Module Attributes

ATTR	Module attribute
01	Area for 16-bit length data except SI
02	Area for BCD 8 digits
03	SI
04	DI

5-3-5 List of Status

A process result is included on Reply text as status that is for personal computer.

STA (Hexadecimal code)	Name	Description
00	End normally	Processing is complete normally.
12	Memory write error	Data is written in program area.
20	Undefined command	Specified command code by the personal computer dose not exist.
21	Parameter error	Input data does not sequence correlation to CMND (Example) Read or write by not using 2-byte units for 16-bit area Read or write by not using 4-byte units for 32-bit area
22	In interlock	Operation is available by loader only. Disable operation by personal computer (In Read / Write command case)
24	Module No. error	Unexisting module is designated
32	Over memory size	Oversized address for module No. is designated
A7		Disclosed when error occured in Transfer command.

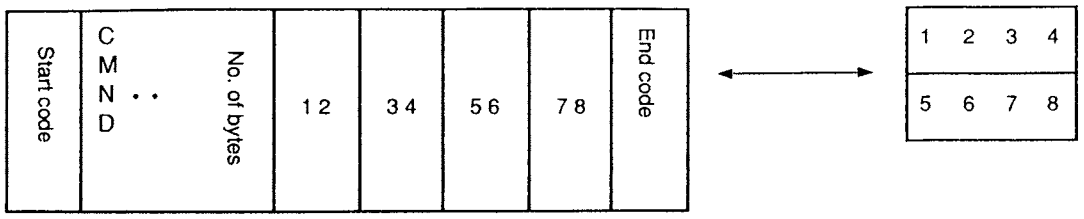
5-3-6 Data Sequence

Sequence of data to be stored will differ from the memory type of MICREX-F.

Read / Write Command

1. 16 bit data length (Attribute is "01")

Personal computer side

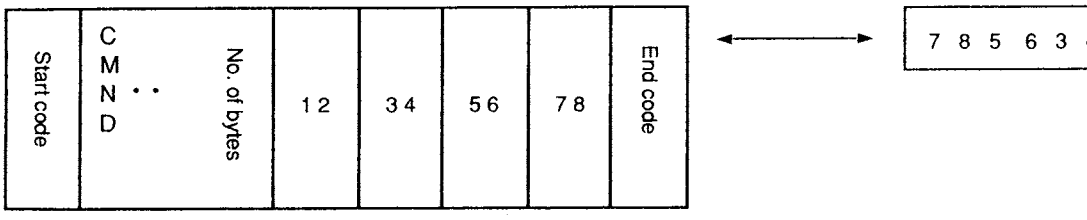


MICREX-F side

1	2	3	4
5	6	7	8

2. 32 bit data length (Attribute is "02" and "04")

Personal computer side

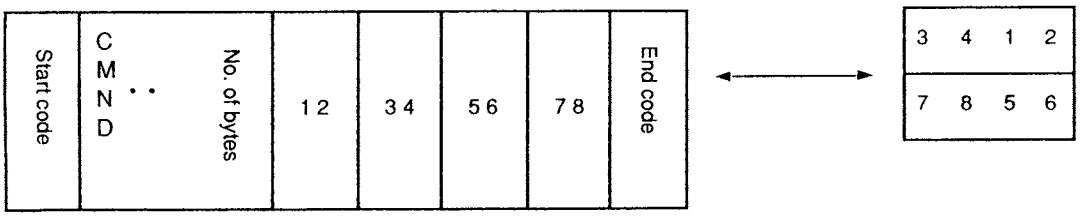


MICREX-F side

7	8	5	6	3	4	1	2

3. 16 bit data length (SI type file memory area only. Attribute is "03")

Personal computer side



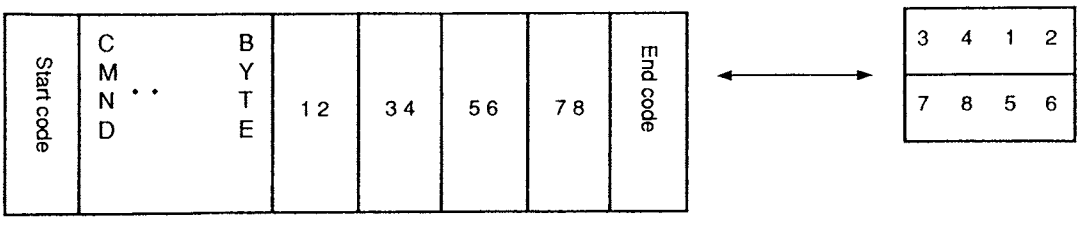
MICREX-F side

3	4	1	2
7	8	5	6

Transfer Command

1. 16 bit data length (SI type file memory area only)

Personal computer side

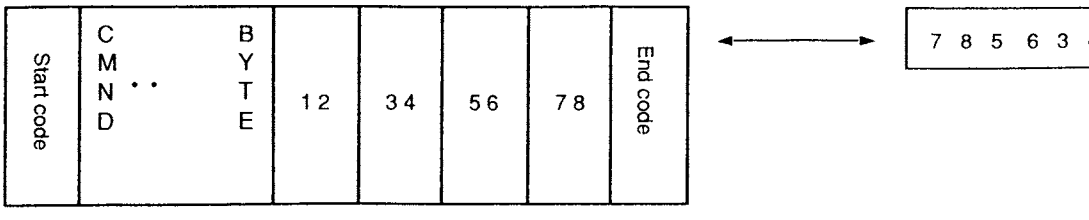


MICREX-F side

3	4	1	2
7	8	5	6

2. 32 bit data length (DI and BD type file memory area only)

Personal computer side



MICREX-F side

7	8	5	6	3	4	1	2

5-4 Data Communication (Mode 1 to 3)

i) Read command (Data flow : Personal Computer← MICREX-F)

Format to be sent by personal computer

Start code	CMND	RSNO	MODE	MOLN	BYTE	Relative address		Read byte		End code
	(00)		(00)		(04)	L	H	L	H	

Format to be received by personal computer

Start code	CMND	STA	MODE	MOLN	BYTE	Relative address		Read byte		ATTR	Read data				End code
	(00)		* 1 (80)			L	H	L	H						

ii) Write command (Data flow : Personal Computer →MICREX-F)

Format to be sent by personal computer (in write data)

Start code	CMND	RSNO	MODE	MOLN	BYTE	Relative address		Write byte		Write data				End code
	(01)		(00)			L	H	L	H					

Format to be sent by personal computer (in clear data)

Start code	CMND	STA	MODE	MOLN	BYTE	End code
	(01)		(05)		(00)	

Format to be received by personal computer

Start code	CMND	STA	MODE	MOLN	BYTE	Relative address		Write byte		End code
	(01)		* 1		(04)	L	H	L	H	

Note : In Read/Write command, MSB bit of "MODE" is "ON". (In the case of SW 2 or 3 only)

iii) Transfer command

Unable to use when mode SW2 or 3 are selected

(Data flow : Personal Computer →MICREX-F)

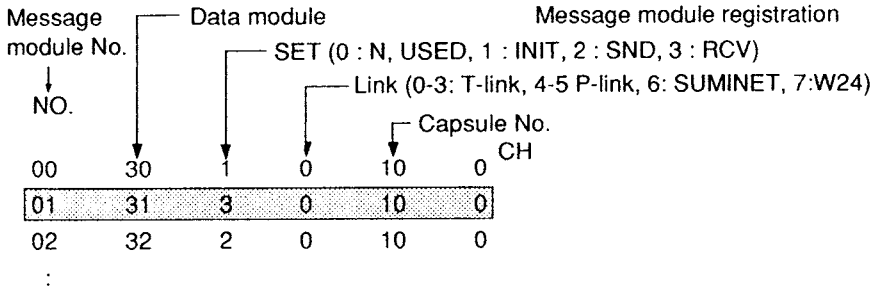
Format to be sent by personal computer

Start code	CMND		MODE	Message module No.	BYTE	Transfer data	End code
	(90)	(00)	(00)				

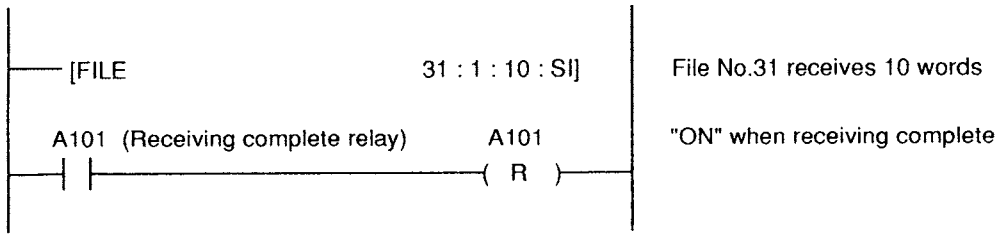
In the case of transfer command, Receiving program and System definition are required for the processor side.

Sample System Definition

Assume that FFU120B is assigned for address 10 and file No.31 is used.



Sample Receiving Program

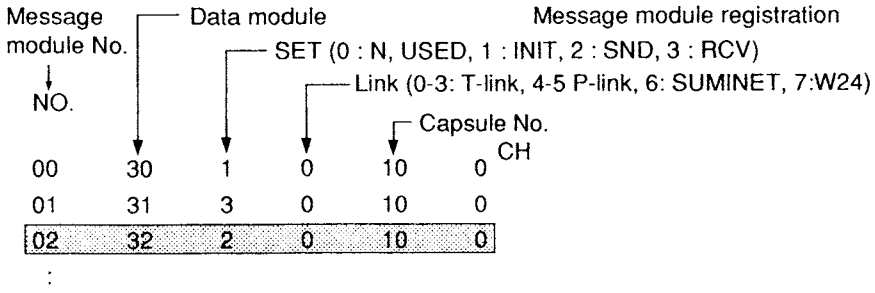


Format to be received by personal computer

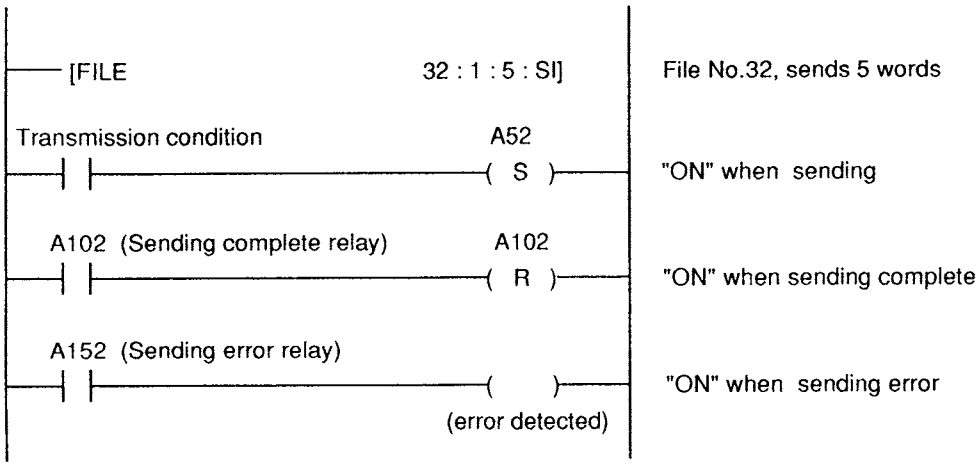
Start code	CMND	STA	MODE	Message module No.	BYTE	End code
	(90)		(00)		(00)	

iv) Transfer command (Data flow: Personal Computer◄– MICREX-F)
In case of transfer command, Transmitting program and System definition are required for the processor side.

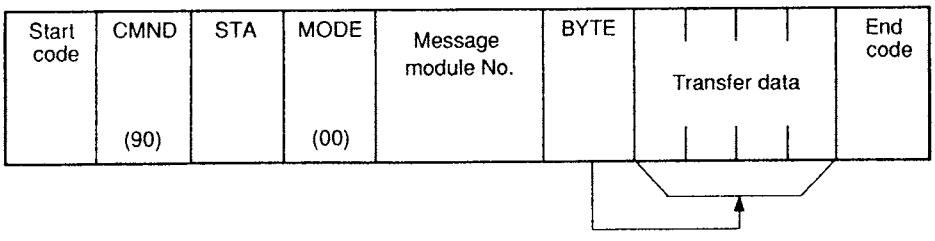
Sample System Definition
Assume that FFU120B is assigned for address 10 and file 32 is used.



Sample Transmitting Program



Format to be received by personal computer



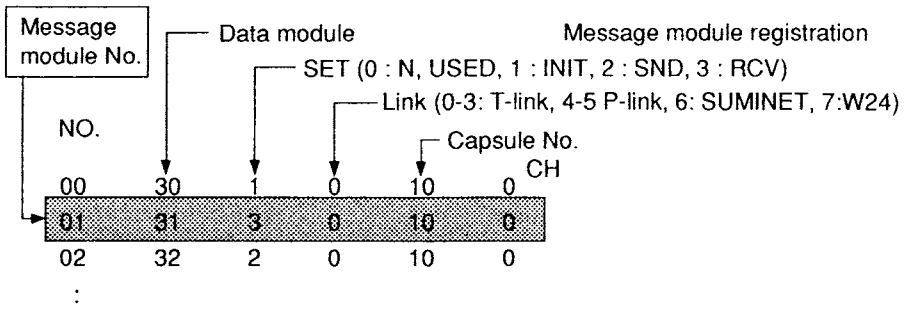
5-5 Data Communication (Mode 4 to 5) Applicable for Transfer Command only

i) Transfer (Data flow : Personal Computer →MICREX-F)

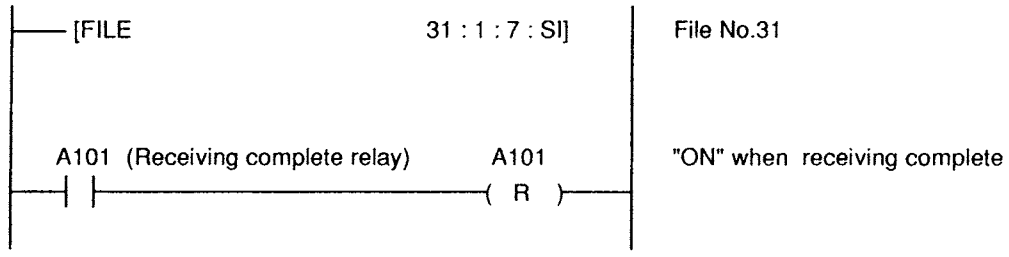
In the case of transfer command, Receiving program and System definition are required for processor side.

Sample System Definition

Assume that FFU120B is assigned for address 10 and file No.31 is used.



Sample Receiving Program



Format to be sent by personal computer

Start code	Data 1	Data 2	Data 3	Data 4	Data •	Data •	Data •	Data •	Data •	Data N	End code

Note : 1 ≤ N ≤ 216 bytes

Note : In fixed length, this format is not set-up of Start code, End code or BCC. All items are treated as data.

Format to be stored on MICREX-F (In the case of SI type file)

0·····7 8·····F

No. of data bytes	(N)
00	Status
Data 1	Data 2
Data 3	Data 4
:	:
N-1	N

Note : 1 ≤ N ≤ 216 bytes

Note : Status : Stores status of receiving data as normal or as error.

00 : Receiving normal

01 : Receiving error

Format to be stored on MICREX-F (In the case of DI or BD type file)

0·····7 8·····F 10·····17 18·····1F

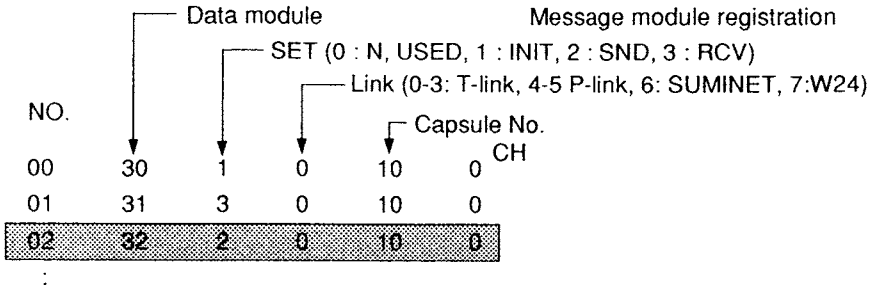
00	Status	No. of data bytes (N)	
Data 3	Data 4	Data 1	Data 2
:	:	:	:
Data N-1	Data N	Data N-3	Data N-2

ii) Transfer (Data flow : Personal Computer ← MICREX-F)

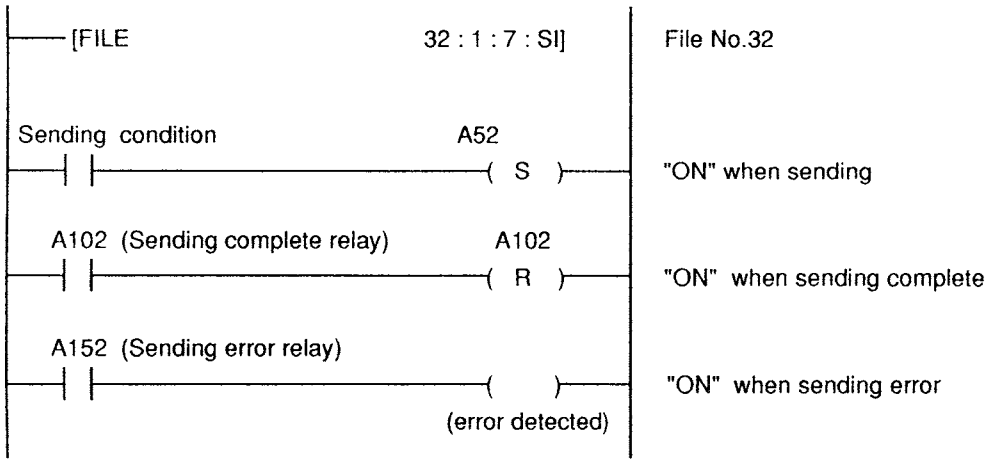
The processor must be provided with Transmitting program and System definition to transfer.

Sample System Definition

Assume that FFU120B is assigned for address 10 and file No.32 is used.



Sample Transmitting Program



Format to be sent by MICREX-F (In the case of SI type file)

0·····7 8·····F

No. of data bytes	(N)
00	00
Data 1	Data 2
Data 3	Data 4
:	:
N-1	N

Note : 1 ≤ N ≤ 216 bytes

Format to be stored on MICREX-F

(In the case of DI or BD type file)

0·····7 8·····F 10·····17 18·····1F

00	00	No. of data bytes (N)	
Data 3	Data 4	Data 1	Data 2
:	:	:	:
Data N-1	Data N	Data N-3	Data N-2

Format to be received by personal computer

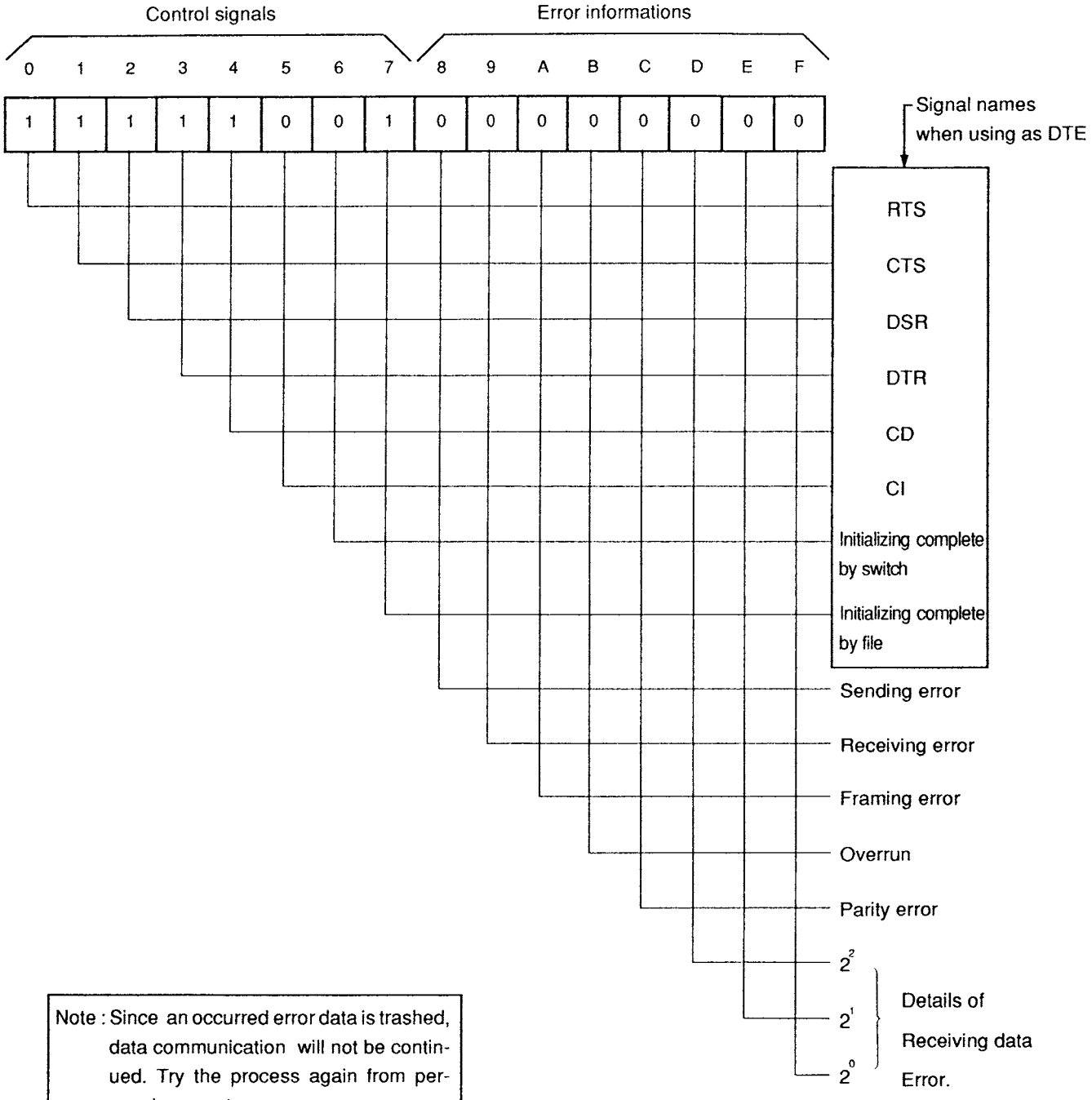
Start code	Data 1	Data 2	Data 3	Data 4	Data ·	Data ·	Data ·	Data ·	Data ·	Data N	End code

Note : 1 ≤ N ≤ 216 bytes

Note : Start code and End code are not affixed in fixed length.

5-6 Status Information

Control signals of this module or communication error informations are set on area WB allocated in this module. For instance, if address 3 is designated, it reads WB0003 of the processor by the program loader.
Reference : If initialization is complete without initial error, the following informations will appear.



Note : Since an occurred error data is trashed, data communication will not be continued. Try the process again from personal computer.

○ CTS, RTS, DTR, DSR, CD and CI
These indicate status of control signal of RS-232C.

○ Framing error, Overrun error and Parity bit error
If any of the above (receiving) errors occur, the error bit will be set onto their corresponding bit and will be saved until the power of this module is turned "OFF".

○ Initializing complete by switch
The bit will be set when initialization is completed normally by switch.
(Applicable to Mode 1 to 3 only. Refer to section 3-4.)

○ Initializing complete by file
The bit will be set when initialization is completed by transferring initial file.
In occurrence of an error, this bit cannot be set and the last 8 bit units (8-F) indicate initial error informations.
(Refer to section 4-7.)

○ Sending error
The bit will be set when sending ends to error and is reset in normal sending.

○ Receiving error
The bit will be set when receiving ends to error and is reset in normal receiving.

○ Details of receiving data error
A result of received data is checked and will be set.
Error number occurred, the last will be set.

Bit position			Error No.	Description
D	E	F		
0	0	0	0	Normal
0	0	1	1	Receiving buffer full (512 bytes)
0	1	0	2	Start code unidentified
0	1	1	3	————
1	0	0	4	————
1	0	1	5	BCC error
1	1	0	6	Text is too long (Note 1)
1	1	1	7	Text form unidentified

Note 1) Data length according to Mode No. of set switch.
Mode No.1 to No.3 : When data is received that exceeds 220 bytes.
Mode No.4 and No.5 : When data is received that exceeds 216 bytes.

Chapter 6

Installation

6-1 Module Installation

6-1-1 Applicable Base

List of applicable bases for mounting this module. This module is suitable for mounting on processors F80H / F120H series and unsuitable for mounting on processors F80 / F81 / F120 and F200.
(Unsuitable mounting may result in malfunctions to the processor as fatal fault.)

○ : Capable
X : Incapable

Processor base		T-link interface base		Direct I / O base	
F80H / F120H	F80 / 81, F120	FTL-H	FTL	FDL	FDL
		Mode 1 is set			(For F200)
○	X	○	X	○	X

Applicable bases for the module

F80H	FSB 084H
FTL	FSB 086H
FDL	FSB 088H
(For 120H)	FSB 110H
F120H	FSB 124H
	FSB 126H
	FSB 128H

6-1-2 Limitation on Module Mounting

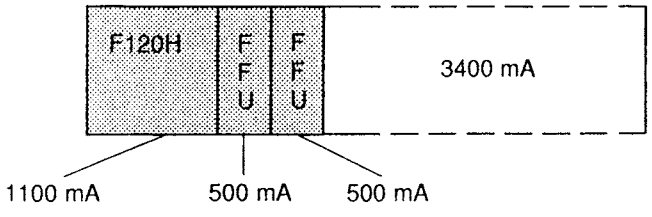
The number of modules mounted is limited by the 5V power capacity of processor F80H/F120H, FTL or FDL.

< Example >
When mounting 2 modules on processor F120H (Power source 5.5A type).

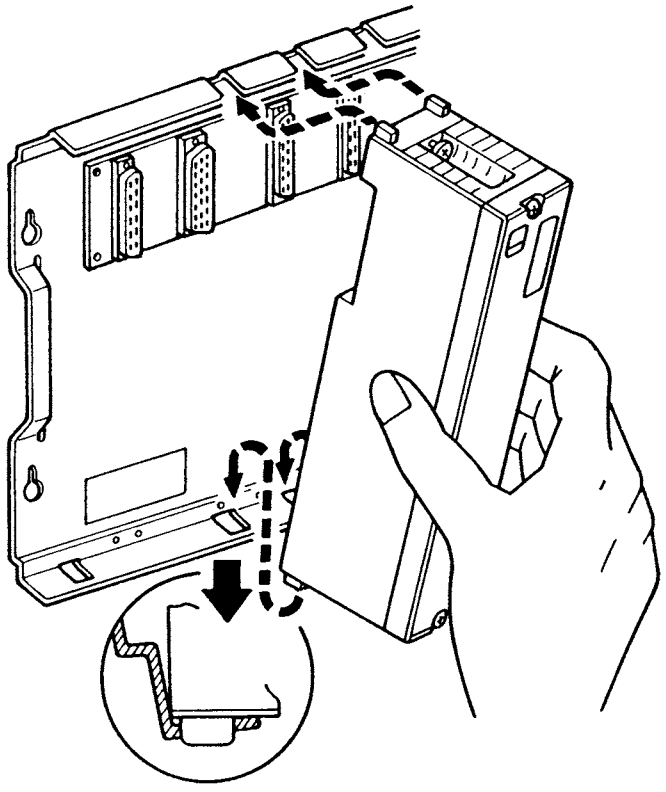
Current consumption of processor F120H ..... 1100 mA
Current consumption of module FFU120 ..... 500 mA X 2

5500 - 1100 - 500 x 2 = 3400 mA

3400 mA is available on 5V power capacity type processors.



6-1-3 Module Installation



Turn the power "OFF" during installation and follow these procedures.

1. Insert guides on the bottom of the module into the square holes on the base. (2 guides)

2. Depress it toward the base as illustrated with arrows. When guides on the top of the module are attached to the slit of the base, the connection will be in place.

3. Tighten the 4 screws on the bottom and the top (2xM3.5). (Range of tightening torque is 0.8 to 0.9 N • m {8 to 9 kgf • cm})

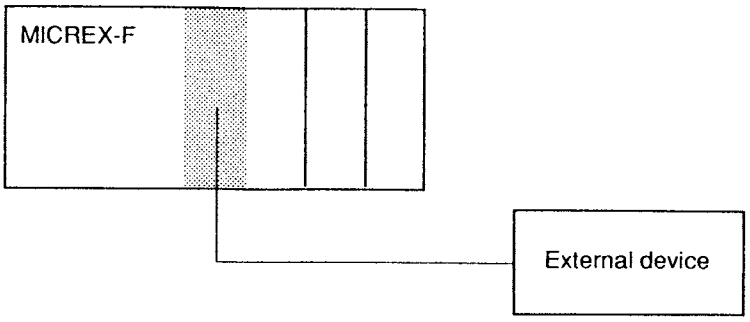
   Reverse the procedure to remove the module.

4. When a basic unit has unused slots, the unused slots must not be positioned between used slots. The unused slots must be positioned at the right end. FTU/FFU modules must be mounted consecutively from the left end.

Note) Do not mount the module on a base that dose not have guide holes (excluding F80H / F120H series). Improper mounting may cause a fatal fault.

6-2 External Connection

6-2-1 Connection by RS-232C (1 : 1 system)



Use a cross cable if external device is a personal computer.

Use a straight cable if external device is a modem, etc.

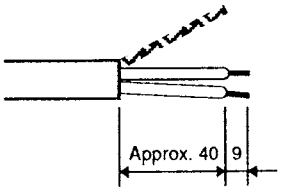
Use the purchased cable, according to the Mode to be set. Refer to section 3-3 for cable connection.

6-2-2 Connection by RS-485

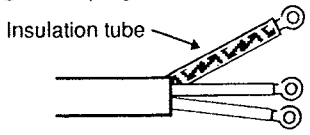
Illustrates wiring procedure to the module terminal block located in the front.

■ Cable end preparation

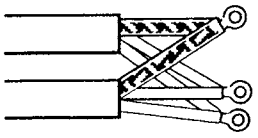
① Strip back



② Crimping terminals



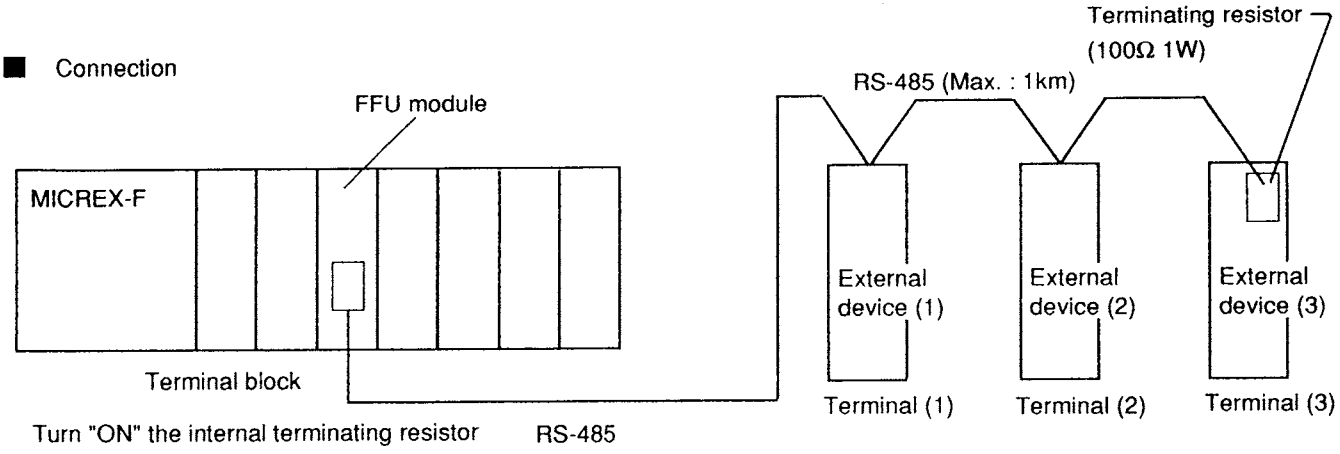
When two wires are to be connected to one terminal block, each pair of wires can be connected to one crimp terminal for convenience.



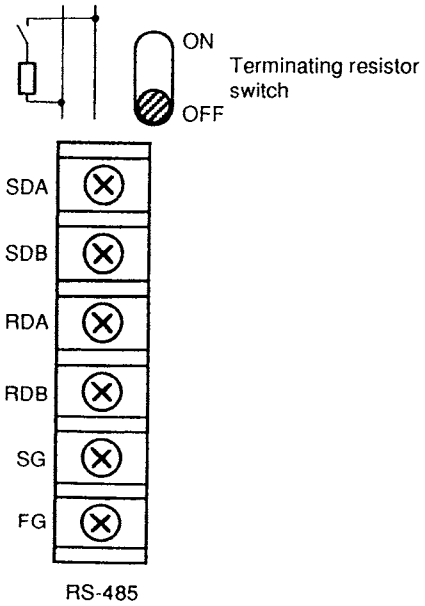
Connecting wires without crimped terminals directly onto a terminal block may not be a sufficient contact, resulting in transmission failures. Be sure to use crimp terminals.

Manufacturer	Type
JST (Nichiatsu)	2-M3
Toei	2-3.5, 2-4S

■ Connection



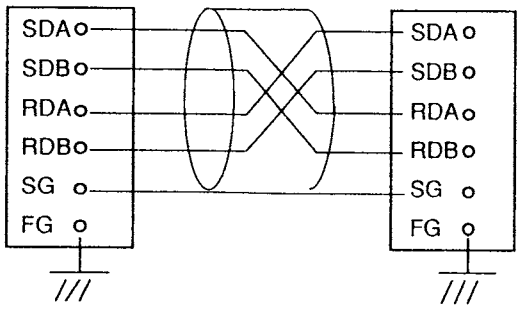
(Terminal allocation of RS-485)



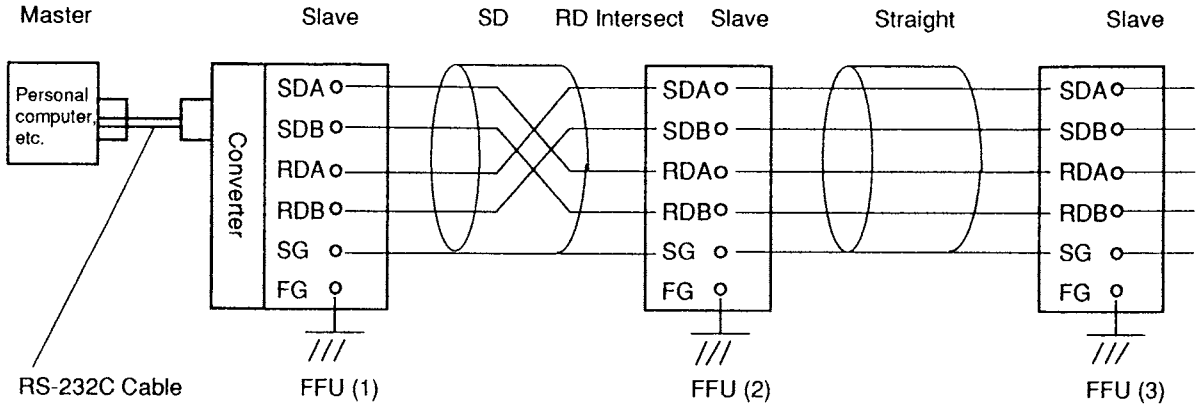
No.	Signal name	Signal flow	Description
1	SDA	→	Send data signal wire A
2	SDB	→	Send data signal wire B
3	RDA	←	Recieve data signal wire A
4	RDB	←	Recieve data signal wire B
5	SG		Signal ground
6	FG		Framed ground

■ Correlative Connection of RS-485 Signal Wires

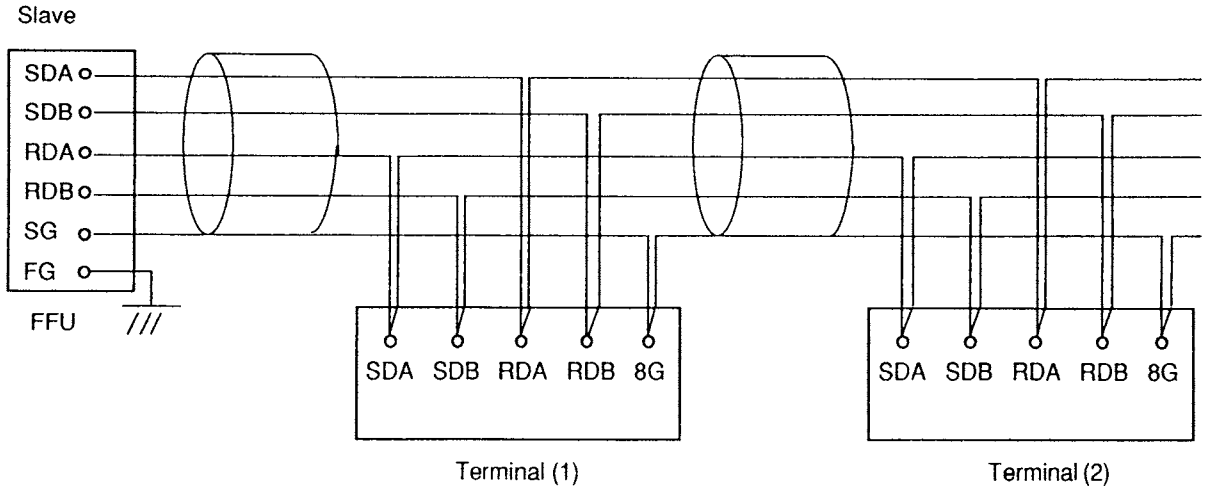
1 : 1



1 : N



1 : N



Note 1) Use a shielded wire for cable.

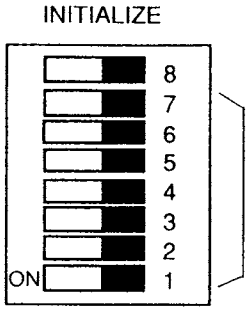
Chapter 7

Sample Programs

7-1 Notes on Applying Sample Program

Adjust the following switches of FFU120B and personal computer when applying the listed sample programs in this manual.

1. Mode set switch ——→Set to Mode 1.
2. Character formation switch →Set according to the figure below.

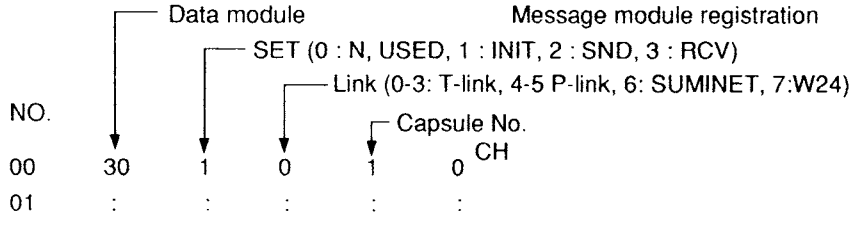


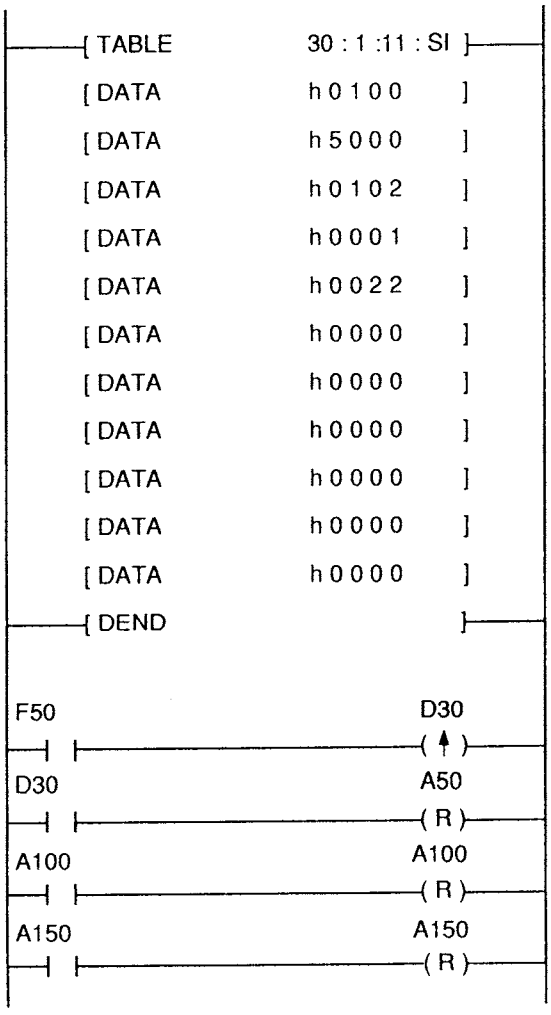
INIT ———— "Initial file"

In the case of "Initial file setting", these switches are ignored.
(Set all switches "OFF")

3. Make MICREX-F program as shown below.

Message module registration



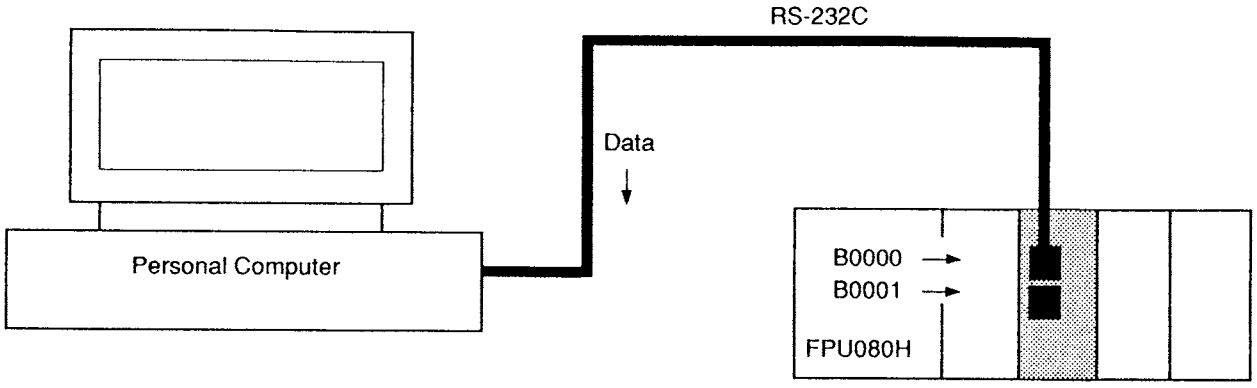


9600 BAUD, 7 bit, parity, none and Stop bit 1

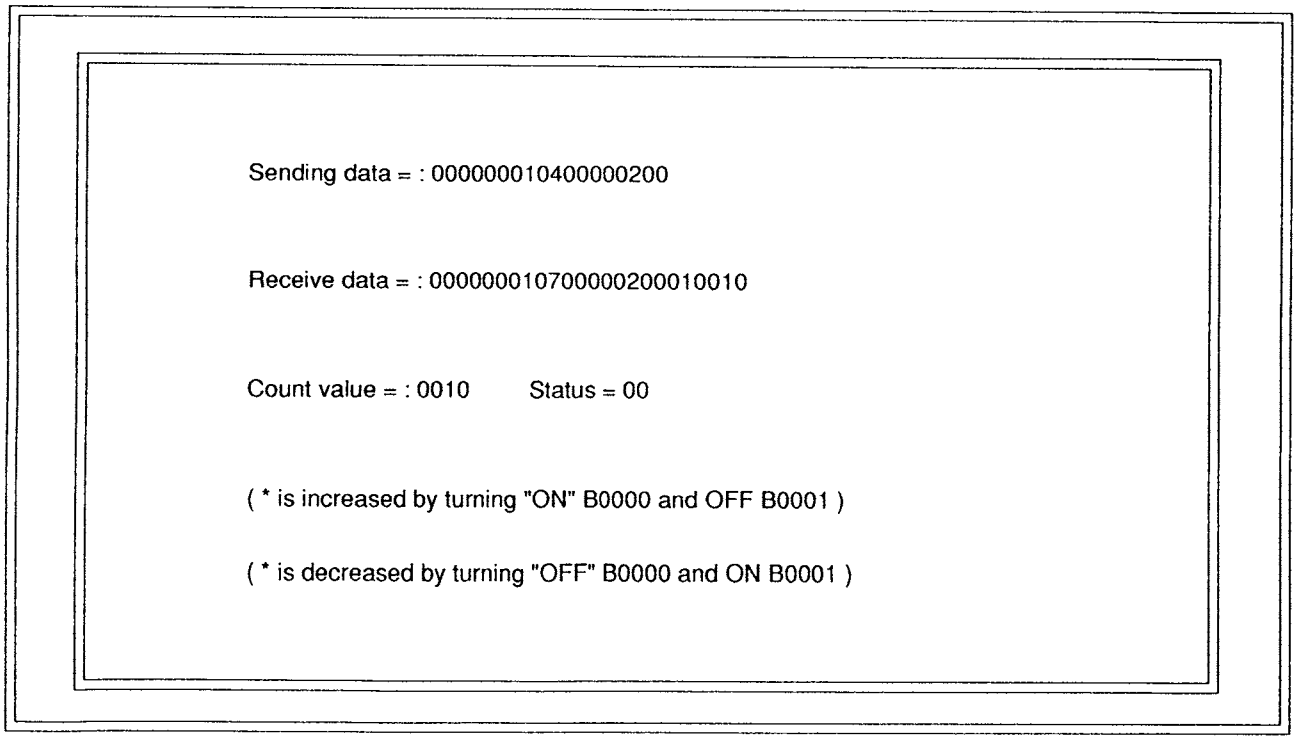
7-2 Read Command

7-2-1 System Definition

Increasing or decreasing 0.1 second per interval of count speed can be adjusted by the increase switch (B0000) and decrease switch (B0001). Counter current value is stored on auxiliary relay area. In this example, the auxiliary relay area is read by the module and the Read data, Sending data, Receiving data, Status, Counted value and Graph will be displayed on CRT screen of the personal computer.

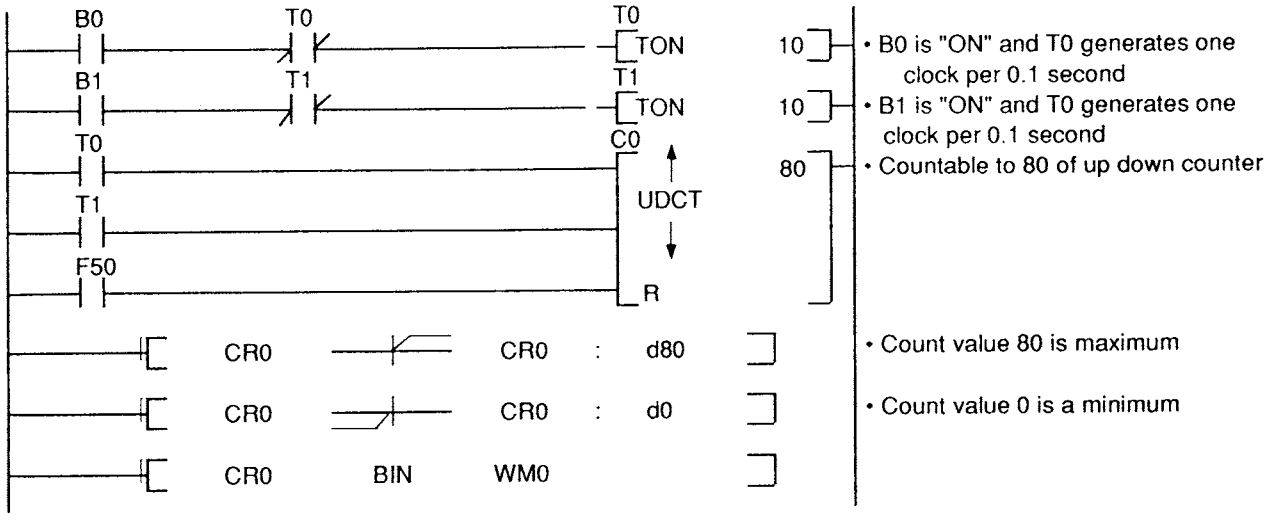


CRT screen



7-2-2 MICREX-F Program

Essentially, when applying the read command, it is unnecessary to create a program for MICREX-F. This clause introduces a program to increase/decrease data of auxiliary relay WM0.



7-2-3 Personal Computer Program (GW-BASIC)

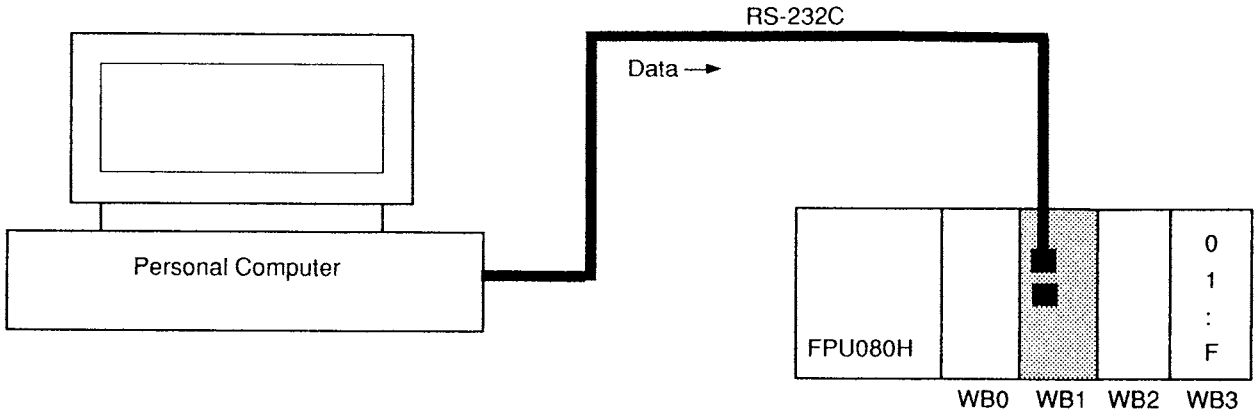
```
100  ' *** Read ***
110  CLS
120    OPEN "com1 : 9600, n, 7, 1" AS #1
130    SND$= " :000000010400000200"
140    PRINT #1, SND$ + CHR$ (&HD);
150    LINE  INPUT #1, RCV$
160    LOCATE 3, 10
170    PRINT  "Send data =" ; SND$
180    LOCATE 8, 10
190    PRINT  "Receive data =" ; RCV$
200      SDAT$=MID$ (RCV$, 22, 4)
210      SSTA$=MID$ (RCV$, 4, 2)
220    LOCATE 13, 10
230    PRINT  "Count value =" ; SDAT$
240    LOCATE 13, 33
250    PRINT  "Status =" ; SSTA$
260    D = VAL ("&H" + SDAT$)
270    BAR$ = STRING$ (D, " * " ) + SPACE (80 - D)
280    LOCATE 18, 10
290    PRINT BAR$ : GOTO 130
300  CLOSE
310  END
```

START CODE		:
CMND		00
RSNO		00
MODE		00
MOLN		01
BYTEN		04
RELATIVE ADDRESS	L	00
RELATIVE ADDRESS	H	00
READ BYTE	L	02
READ BYTE	H	00

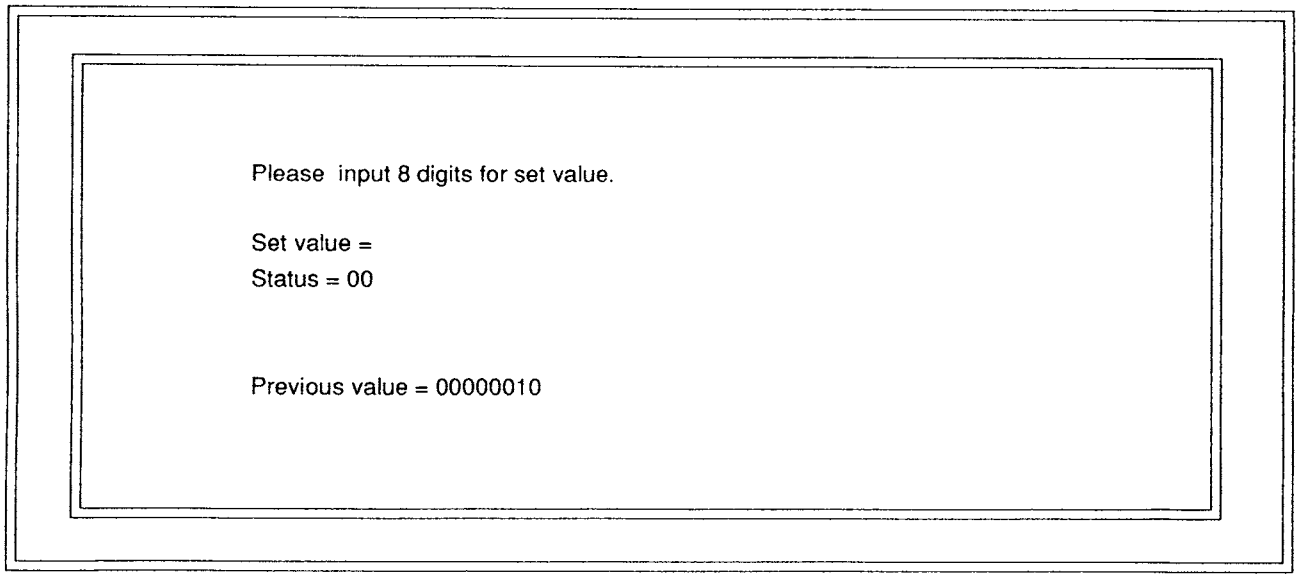
7-3 Write Command

7-3-1 System Definition

Input set value for the timer T0 by personal computer keyboard. The LED light of WB3 moves at an interval of transferred set value. The set value and the previous set value is displayed on the personal computer CRT screen and if sent data error occurs, it also displays the error and ends.

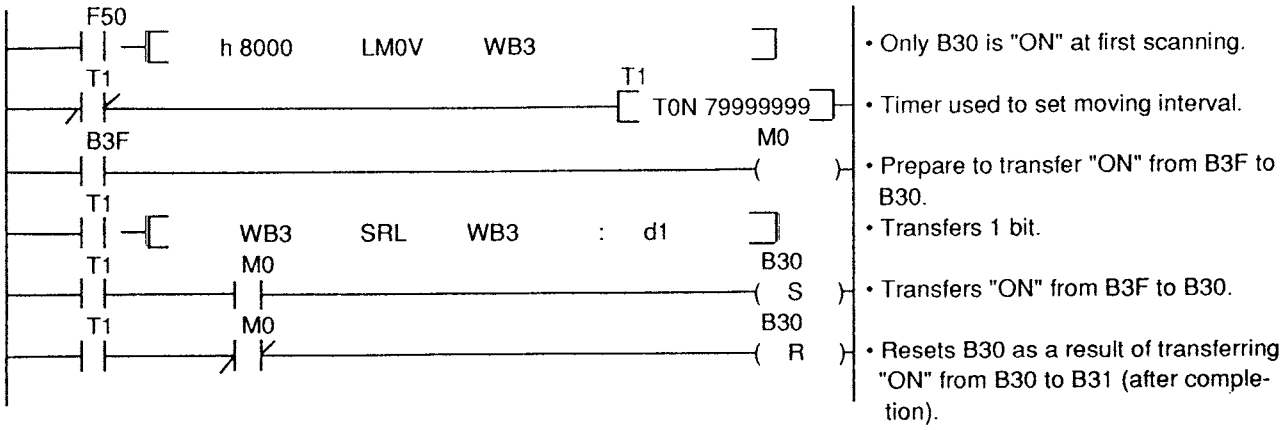


CRT screen



7-3-2 MICREX-F Program

Essentially, when applying the write command, it is unnecessary to create a program for MICREX-F. This clause introduces a program to rotate 1 bite out of WB3 as ring counter.



7-3-3 Personal Computer Program (GW-BASIC)

```
100  ' *** WRITE ***
110  CLS
120  OPEN "com1 : 9600, n, 7, 1" AS #1
130  LOCATE 5, 10
140  PRINT "Please input 8 digits for set value"
150  LOCATE 8, 10
160  LINE  INPUT " Set value = "; TDAT$
170  SND$= " : 0100000A0801000400 "
180       ST1$= MID$ (TDAT$, 7, 2)
190       ST2$= MID$ (TDAT$, 5, 2)
200       ST3$= MID$ (TDAT$, 3, 2)
210       ST4$= MID$ (TDAT$, 1, 2)
220       TD$= ST1$ + ST2$ + ST3$ + ST4$
230  PRINT #1, SND$ + TD$ + CHR$ (&HD);
240  LINE INPUT #1, RCV$
250  TSTA$= MID$ (RCV$, 4, 2)
260  LOCATE 11, 10
270  PRINT "Status =" ; TSTA$
280  LOCATE 15, 10
290  PRINT "Previous value =" ; TDAT$
300  D=VAL (TSTA$) : IF D=0 GOTO 130
310    LOCATE 11, 30
320    PRINT " Communication error! "
330  CLOSE
340  END
```

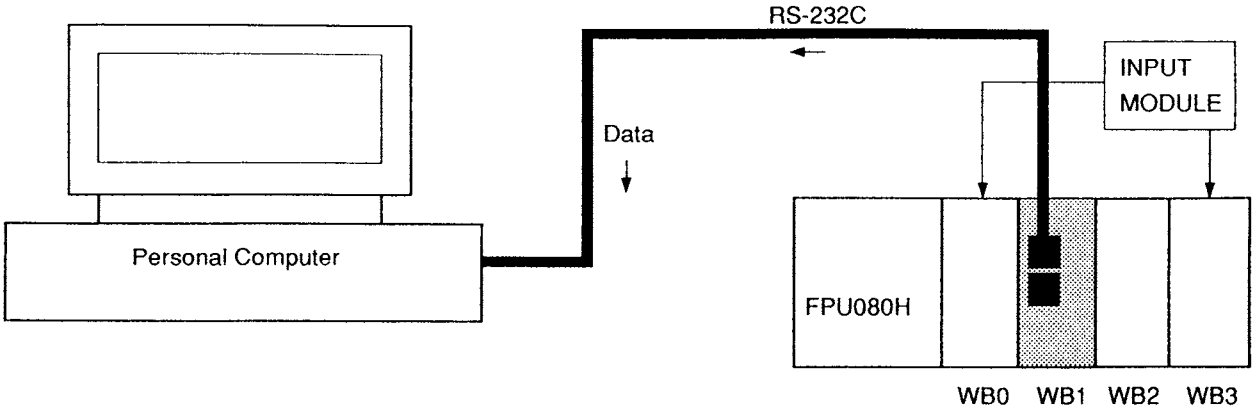
Rearrange data

START CODE	:
CMND	01
RSNO	00
MODE	00
MOLN	0A
BYTEN	08
RELATIVE ADDRESS L	01
RELATIVE ADDRESS H	00
WRITE BYTE L	02
WRITE BYTE H	00

7-4 Transfer Command (MICREX-F → Personal Computer)

7-4-1 System Definition

The set data on WB3 is sent to the personal computer per turning "ON" the send switch (B0000), and the data, date and time will be displayed on the personal computer CRT screen.



CRT screen

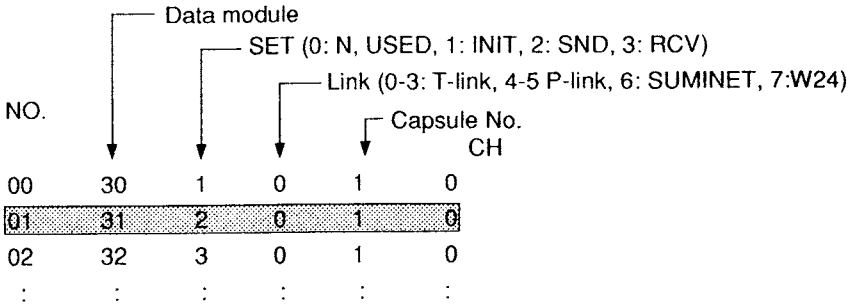
Date = 10-20-1992	Time = 10:00	Received data = 1234
Date = 10-20-1992	Time = 10:00	Received data = 1234
Date = 10-20-1992	Time = 10:00	Received data = 1234
Date = 10-20-1992	Time = 10:00	Received data = 1234
Date = 10-20-1992	Time = 10:00	Received data = 1234
Date = 10-20-1992	Time = 10:00	Received data = 1234
.	.	.
.	.	.
.	.	.
.	.	.

7-4-2 MICREX-F Program

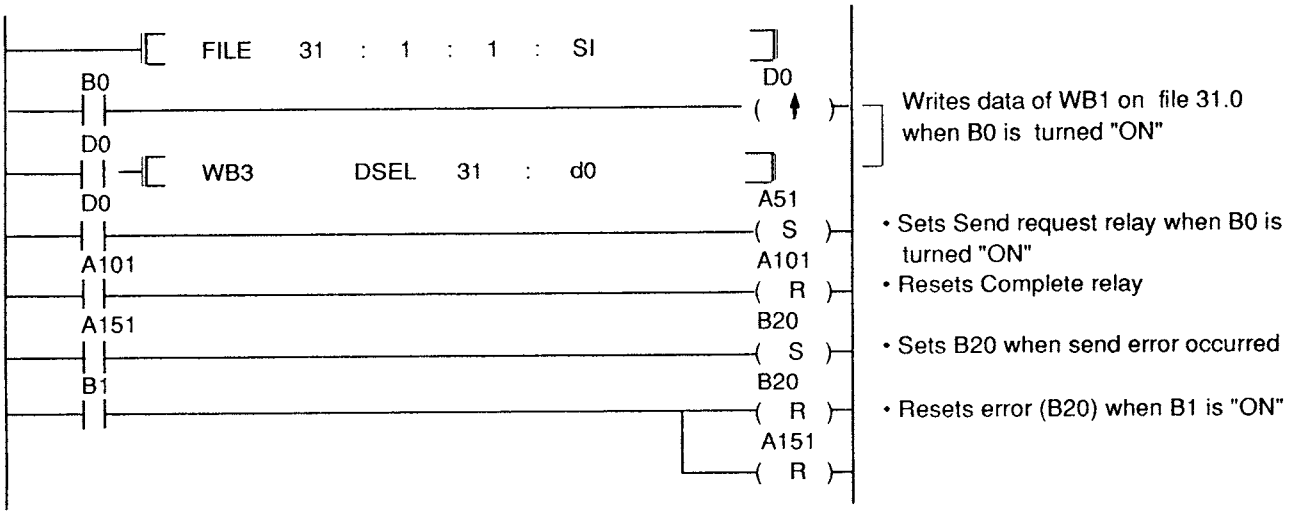
(1) MICREX-F Side Setup

Apply Message Communication to transfer data to the personal computer. (Refer to MICREX-F User's Manual [Software] for details of Message communication.) The following programs as for Message module registration and Message communication are required to execute the message communication.

Message Module Registration



(2) MICREX-F Side Program



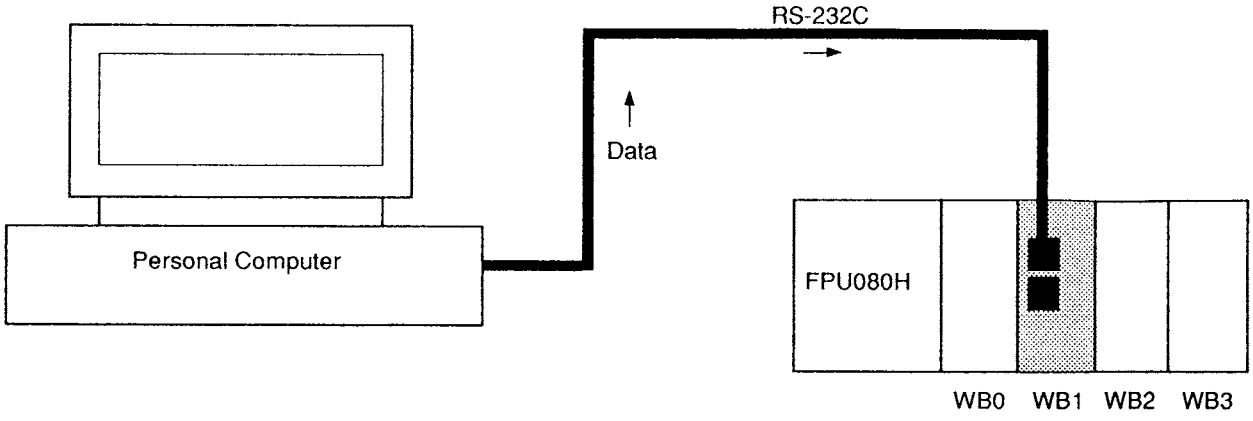
7-4-3 Personal Computer Program (GW-BASIC)

```
100  ' *** RECEIVE DATA ***
110  CLS
120  OPEN "com1 : 9600, n, 7, 1" AS #1
130  LINE INPUT #1, RCV$
140      R1$=MID$ (RCV$, 14, 2)
150      R2$=MID$ (RCV$, 12, 2)      Rearrange data
160      RV$=R1$+R2$
170    PRINT " DATE =" ;DATE$, " TIME =" ; TIME$, "Receive data="; RV$
180  GOTO 130
190  CLOSE
200  END
```

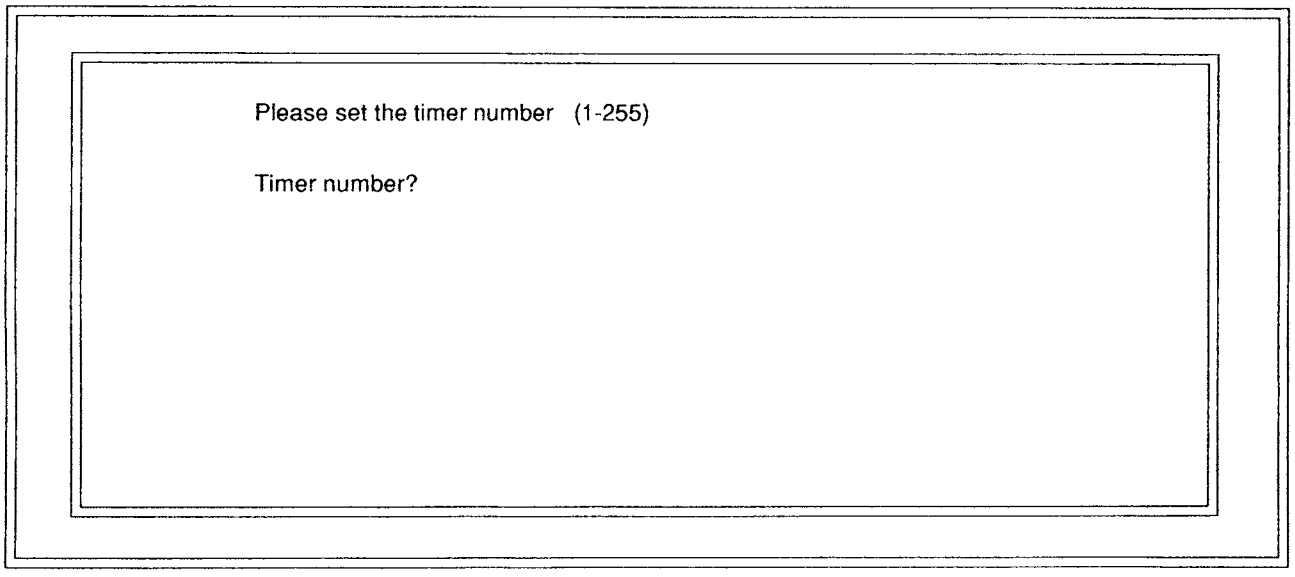
7-5 Transfer Command (Personal Computer → MICREX-F)

7-5-1 System Definition

Send the timer number and timer set value from the personal computer to file area of the MICREX-F.



CRT screen

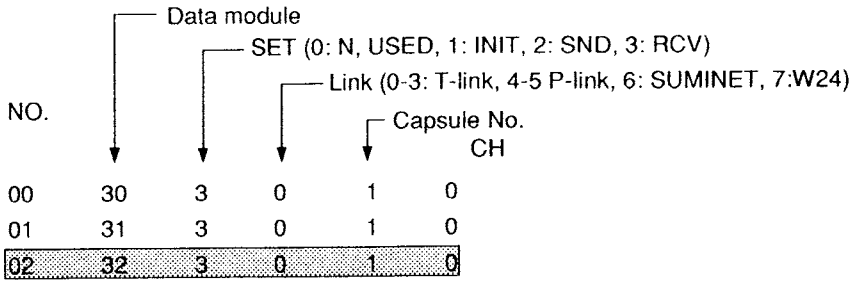


7-5-2 MICREX-F Program

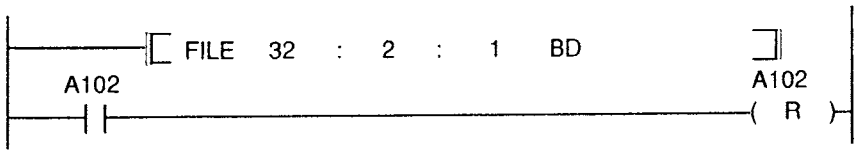
(1) MICREX-F Side Setup

MICREX-F side receives data from the personal computer by Message communication. (Refer to MICREX-F User's Manual [Software] for details of Message communication.) The following programs as for Message module registration and Message communication are required to execute the message communication.

Message Module Registration



(2) MICREX-F Side Program



• Resets A102 by itself after receiving message is complete.

7-5-3 Personal Computer Program (GW-Basic)

```
100 ' ***  SEND DATA  ***
110 CLS
120 OPEN "com1 : 9600, n, 7, 1" AS #1
130 LOCATE 5, 10
140 PRINT "Please set the timer number (1-255)"
150 LOCATE 7, 10
160 INPUT "Timer number"; N
170 LOCATE 10, 10
180 PRINT "Input set value by 8 digits"
190 LOCATE 12, 10
200 INPUT "Set value"; S$
210 LOCATE 14, 10
220 PRINT "Set complete! Now transferring"
230       DA1$ = MID$ (S$, 7, 2)
240       DA2$ = MID$ (S$, 5, 2)
250       DA3$ = MID$ (S$, 3, 2)
260       DA4$ = MID$ (S$, 1, 2)
270 S1$ = DA1$ + DA2$ + DA3$ + DA4$
280 N$ = HEX$ (N)
290 IF N < 16 THEN DAT$ = "0" + N$ + "000000" + S1$ ELSE  DAT$ = N$ + "000000" + S1$
300 SND$ =" : 9000000008"
310 PRINT #1, SND$ + DAT$ + CHR$ (&HD);
320 LINE INPUT #1, RCV$
330 STA$ = MID$ (RCV$, 4, 2)
340 LOCATE 14, 35
350 PRINT "Status ="; STA$
360 LOCATE 16, 10
370 PRINT "Do you want to set another timer?"
380 LOCATE 18, 10
390 INPUT "Yes : Y  No : Another key"; A$
400 IF A$ = "Y" GOTO 130
410 CLOSE
420 END
```

Rearrange data

START CODE	:
CMND	90
RSNO	00
MODE	00
MESSAGE MODULE NO.	02
BYTEN	08

Appendix

Appendix

The table compares specifications between the interface capsule FFU100A-C10 for MICREX-F and combines its memory cassette.

Item \ Memory type		FMC310A-T	FMC311A-T	FMC312A-T
		Independent Synchronization BSC contention procedure	Non-procedure of Start-Stop synchronization	Non-procedure of command set type Start-Stop synchronization
Interface		RS-232C		
Connection method		Full duplex communication line (4W) / Half duplex communication line (2W)		
No. of lines		1 line		
Communication method		Half duplex	Full duplex / Half duplex	
Transmission procedure		BSC method (Connection method)	Non-procedure	
Synchronous method		Independent synchronization	Start-Stop synchronization	
Baud rate		1200/2400/4800/9600	300/600/1200/2400/4800/9600	
Responce method		ACK0/ACK1 and NAK Alternate response	————	
Transmission control code		EBCDIC in units of 8	Select JIS in units of 7 (same as ASCII), JIS in units of 8 or EBCDIC in units of 8	
Transmission code		Binary data (Optional)		
Error control	Hardware		Vertical parity, framing, overrun	
	Software	CRC-16 by BSC procedure	Horizontal parity	
Bit transmitting sequence		Sends in acsending order from low rank bit		
Conversation mode		No support	————	
Message length		Variable length single text Max. of 220 bytes	Fixed length/Variable length Max. of 216 bytes	Variable length Max. of 220 bytes
Start code End code		By BSC procedure	None, STX, :, ::, Setup ETX, CR, LF, CR • LF, DLE • ETX, Setup	
Character formation		By BSC procedure	Start bit : 1 bit Data bit : 7/8 bits Parity bit : None / Odd / Even Stop bit : 1 / 1.5 / 2 bits	
Purpose		To support BSC procedure • Fujitsu 9450-II • Panafacom C280 • IBM 5550	With function of RS-232C interface • Personal computer • Bar code reader • Indicator •Printer	For personal computer

Appendix RS-232C Signal Names

Signal symbol				Signal definition	Signal flow Terminal Modem (PIF) (Personal computer)	Terminal connector No.
RS-232C	CCITT	JIS	Others			
AA	101	(FG)		Protective ground		1
BA	103	SD	TXD	Transmitted data	→	2
BB	104	RD	RXD	Received data	←	3
CA	105	RS	RTS	Request to send	→	4
CB	106	CS	CTS	Clear to send	←	5
CC	107	DR	DSR	Data set ready	←	6
AB	102	SG	SG	Signal ground (Common return)		7
CF	109	CD	CD	Received line signal detector	←	8
				(Reserved for data set testing)		9
				(Reserved for data set testing)		10
				(Unassigned)		11
SCF	122	BCD		Secondary recieved line for signal detector	←	12
SCB	121	BCS		Secondary clear to send	←	13
SBA	118	BSD		Secondary transmitted data	→	14
DB	114	ST2	TXC	Transmission signal element timing (DCE source)	←	15
SBB	119	BRD		Secondary recieved data	←	16
DD	115	RT	RXC	Receiver signal element timing (DCE source)	←	17
				(Unassigned)		18
SCA	120	BRS		Secondary request to send	→	19
CD	100.2	ER	DTR	Data terminal ready	→	20
CG	110	SQD		Signal quality detector	←	21
CE	125	CI		Ring indicator	←	22
CH/CI	112/111	SDS		Data signal rate selector (DTE/DCE source)	→	23
DA	113	STI	TXC	Transmit signal element timing (DTE source)	→	24
				(Unassinged)		25
			RR	Receiving ready	→	

	b7 b6 b5	0 0 0	0 0 1	0 1 0	0 1 1	1 0 0	1 0 1	1 1 0	1 1 1
b4 to b1		0	1	2	3	4	5	6	7
0000	0	NUL	TC7 (DLE)	SP	0	@	P	`	p
0001	1	TC1 (SOH)	DC1	!	1	A	Q	a	q
0010	2	TC2 (STX)	DC2	"	2	B	R	b	r
0011	3	TC3 (ETX)	DC3	#	3	C	S	c	s
0100	4	TC4 (EOT)	DC4	$	4	D	T	d	t
0101	5	TC5 (ENQ)	TC8 (NAK)	%	5	E	U	e	u
0110	6	TC6 (ACK)	TC9 (SYN)	&	6	F	V	f	v
0111	7	BEL	TC10 (ETB)	'	7	G	W	g	w
1000	8	FE0 (BS)	CAN	(	8	H	X	h	x
1001	9	FE1 (HT)	EM	)	9	I	Y	i	y
1010	10	FE2 (LF)	SUB	*	:	J	Z	j	z
1011	11	FE3 (VT)	ESC	+	;	K	[	k	{
1100	12	FE4 (FF)	IS4 (FS)	,	<	L	¥	l	|
1101	13	FE5 (CR)	IS3 (GS)	-	=	M	]	m	}
1110	14	SO	IS2 (RS)	.	>	N	^	n	~
1111	15	SI	IS1 (US)	/	?	O	_	o	DEL

Classify	Term	Description	Additional Info.
Transmission procedure	Non-procedure	The method to entrust the error varification control by a terminal operator.	
	BSC procedure	Synchronous communication method, refered to as "Binary Synchronous Communication".	Standardized by IBM
	Basic procedure	Basic data transmission control procedure .(JIS C 6362)	
	HDLC procedure	High level data link control procedure.	
Transmission equipment	DCE	Data Circuit Terminating Equipment.	
	DTE	Data Terminal Equipment.	
	MODEM	Modulation-Demodulation.	
Transmission code system	ASCII	American Standard Code for Information Interchange.	JIS 7 bit code includes ASCII code
	JIS (JIS C 6220)	JIS units of 7-bit code and JIS units of 8-bit code.	
	EBCDIC	Extended Binary-Coded-Decimal Interchange Code Standarized by IBM.	
Error control	Parity check	Automatic error detection by using checking bits along with numerical bits.	
	Parity bit	Error detection by adding an extra bit to a character or word to ensure that there is always either an even or an odd number. There are two methods, a vertical parity checking method and a horizontal parity checking method.	
	BCC	Block check character Add-in, EX-OR, CRC-16, etc.	
	CRC-16	Cyclic Redundancy Checking that one method of BCC as written above.	
	Framming error	Transmission error that occurs when no stop bits are detected in Start-Stop synchronized system.	
	Overrun error	Transmission error that occure when LSI receives the next character before CPU has been read.	

Classify	Term	Description	Additional Info.
Transmitting speed	Data transmitting speed (bps)	No. of bits that to be transmitted per second.	
	Baud rate (Baud)	No. of bits to be transmitted per second.	
Transmission control	Start-bit Stop-bit	Enter start and stop bit at the head anf end of a defined length of data according to Start-Stop synchronization and transmit.	
Transmission signal control wire	DR (DSR)	Data Set Ready Indicates that DCE is active.	
	ER (DTR)	Data Terminal Ready Indicates that DTE is active.	
	CS (CTS)	Clear to Send Indicates that DCE is clear to send.	
	RS (RTS)	Request to Send Signal from DTE is requesting to send data.	
	CI	A signal wire that is ON when DCE is being called from the communication circuit. Status comparable to a ringing telephone.	
	CD	Signal wire that indicates that DTE is able to input or output data for DCE. DEC connects to the circuit when CD is turned ON and disconnects when turned OFF.	
	Transparent mode	Method to pass every data. Not only a bit code, it also sends bit string.	

BCC is calculated as follows.

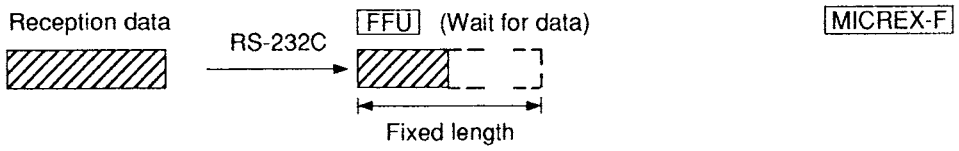
ex.) BCC : Set 1
Location (range) : Start + Text + End
Calculation Method : Add
Code of BCC : Transmission code
Mode switch 1, Read command
Start code = " : (&H3A)", End code = "CR (&HD)"
Transmission frame
: 00 00 00 01 04 00 00 02 00 C B
R C
C
BCC Calculation (Add the ASCII code data)
3A + 30 + 30 + 30 + 30 + 30 + 30 + 30 + 31 + 30 + 34 + 30 + 30 + 30 + 30 + 30 + 32 + 30 + 30 + D = h3AE
Take the lower 1 byte as BCC. → AE
Change the BCC to "Transmission code" AE → 41 • 45
In the case of "BCC : Set2", BCC digits change 41 • 45 → 45 • 41
In the case of "Code of BCC : Binary", BCC is "AE"

Fixed length

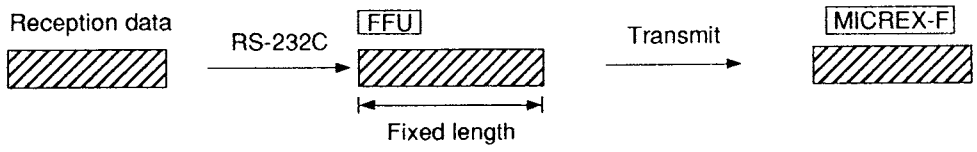
In this setting, all transmission data is treated as data (includes start code, End code, BCC etc. which come from a personal computer or an external device). The data is transmitted for MICREX-F when the "Fixed length" data (specified in the initial file) come from an external device. If the reception data does not exceed the "Fixed length", FFU will wait until the number of reception data comes up to "Fixed length", then FFU transmits the data to MICREX-F. If the reception data exceeds the "Fixed length", FFU will transmit the "Fixed length", and the remaining data will be treated as the next transmission data.

< Explanation >

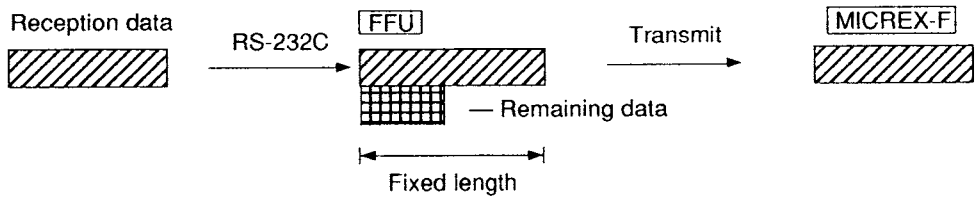
①Reception data < Fixed length



②Reception data = Fixed length



③Reception data > Fixed length



In the case of sending (FFU → External device), Start code, End code and BCC set by "Initial File" are ignored. Only part of the data is transmitted.

Variable length

In this setting, FFU is waiting for "End code" from external device. If the "End code" is sent, FFU transmits data to MICREX-F. In the case of data sending (FFU → External device), Start code, End code and BCC set by initial file are added.

Appendix Table for Initialization

Cut along dashed line

(1) Transmission Procedure → Non-procedure → 0 — 1 ☐

(2) Mode → Set → 1 — 2 ☐

(3) Receive message No. (Mode switch 4 or 5) → Represented by translating decimal to hexadecimal — 3 ☐☐

(4) Baud rate → 300 (→0) 600 (→1) 1200 (→2) 2400 (→3) 4800 (→4) 9600 (→5) 19200 (→6) — 4 ☐

(5) Data bit → 7 bit → 0, 8 bit → 1 — 5 ☐

(6) Parity bit → None → 0, Odd → 1, Even → 2 — 6 ☐

(7) Stop bit → 1 → 0, 1.5 → 1, 2 → 2 — 7 ☐

(8) DCE/DTE → DCE → 0, DTE → 1, For Modem → 2 — 8 ☐

(9) CTS/RTS → RTS ON/In send ON → 0, Always ON → 1 — 9 ☐

(10) DSR/DTR → Always ON → 0 — 10 ☐

(11) Sending condition → DTR ON/CTS ON — 11 ☐

(12) PK access (Mode switch 1 to 3) → Refuse → 0, Permit → 1 — 12 ☐

(13) Transmit code → JIS (ASCII) → 0, EBCDIC → 1 — 13 ☐

(14) Transpose code → None → 0, Yes → 1 — 14 ☐

(15) No. of receive data byte (Mode switch 4 or 5) → No. of receive data bytes — 15 ☐☐

(16) Start code → None (→0), STX, (→1) : , (→2) :: , (→3) Set 1 (→4), Set 2 (→5) — 16 ☐

(17) End code → ETX (→1), CR (→2), LF (→3), CR · LF (→4), DLE · ETX (→5), Set 1 (→6), Set 2 (→7) — 17 ☐ Set 1

(18) Start code → If set 1 or 2 is selected on the item 16, optional code is represented by hexadecimal is translated. The rest are represented by 0. — 18 ☐☐ ☐☐

(19) End code → Write 0 on set 2 when set 1 is selected — 19 ☐☐ ☐☐ Set 2

(20) BCC → None → 0, Set 1 → 1, Set 2 → 2 — 20 ☐

(21) Location (range) → TEXT (→0), TEXT+ End (→1), Start+TEXT (→2), Start+TEXT+End (→3) — 21 ☐

(22) Calculation → Add (→0), Add (INVERT) (→1), EOR (→2), CRC-16 (→3) — 22 ☐

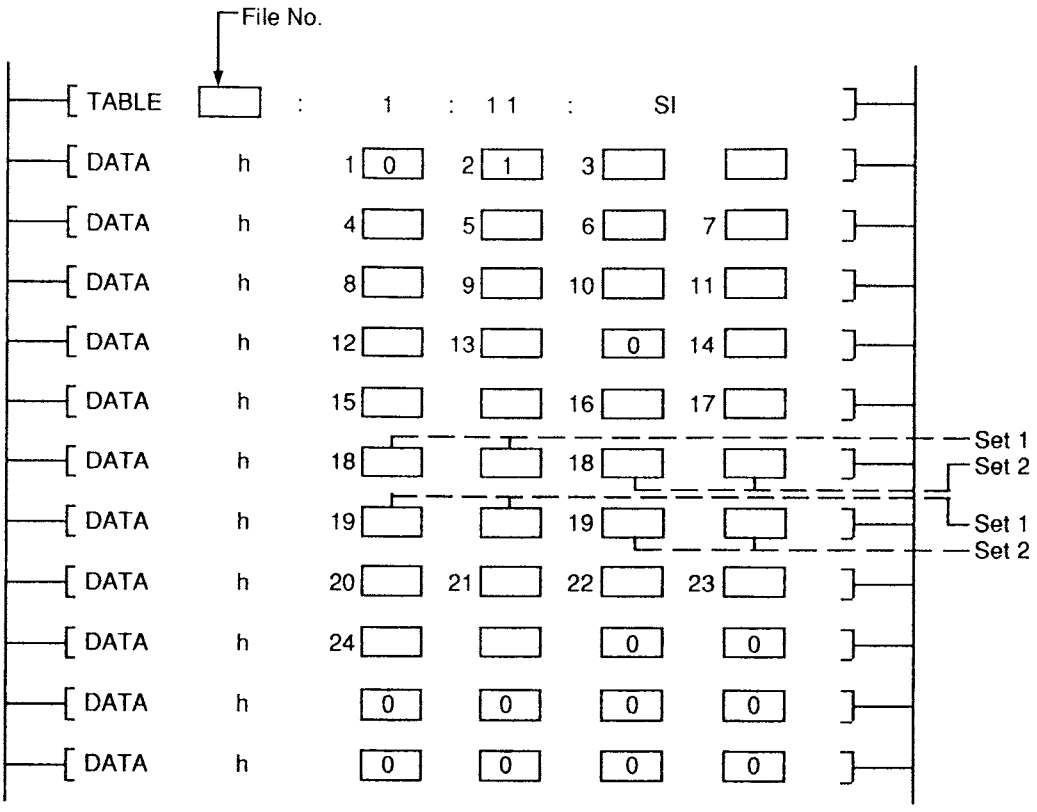
(23) Code → Transmit code → 0 , BINARY → 1 — 23 ☐

(24) Time → Observation timer for sending what is set hexadecimally. (0.1 per sec.) — 24 ☐☐

Enter the selected values above (done by the operator) in numerical sequence order in the squares listed on page next.

Appendix Table for Initialization

< PC Program >



< Operation Mode > MODE Switch No. [ ] (1 to 5)

< Status > WB [ ]

Cut along dashed line

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